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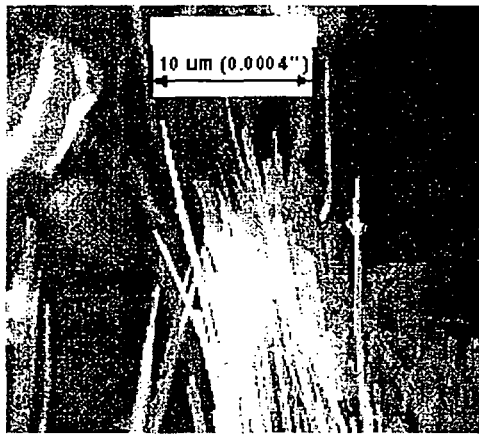
**MARCOR REMEDIATION, INC.  
HEALTH AND SAFETY PLAN  
VERSION 1.1**

SDMS Document ID



2000507

**SCREENING PLANT  
OPERABLE UNIT 02  
LIBBY, MT**



Microscopic view of fibrous bundle in vermiculite  
From the EPA website for Libby, Montana

Developed under contract no. DTRS57-96-D-00036, USDOT VOLPE  
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7-15-00 (date)

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**APPENDIX A**  
**DISMANTLING/DEMOLITION**

## DISMANTLING/DEMOLITION PLAN

### 1.0 - Description

This plan describes the procedures to be employed by MARCOR during the dismantling and controlled demolition of all structures at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2) in Libby, Montana. The structures to be dismantled and demolished are shown on Drawing C2, the Demolition Plan.

### 2.0 - Materials

The approved erosion control plan shall be in place prior to initiating the dismantling/demolition plan.

### 3.0 - Personnel

Equipment operators  
Technicians  
Truck Drivers

### 4.0 - Equipment

Excavator with progressive linkage thumbs  
Excavator with hydraulic shears  
Excavator with concrete pulverizer  
Backhoe  
Wheel Loaders  
Water Trucks  
Pressure Washers  
Platform Lifts  
Boom Lifts  
End Dump Trucks  
Articulating Dump Trucks

### 5.0 - Procedures for Dismantling/Demolition

The work described below shall begin following the completion of the inventory and appraisal of the personal property located at OU2. The Contractor shall perform the personal property appraisal, located at OU2. Upon notification given by the Government, the Contractor shall commence with the procedures described below.

#### 5.1 - Dismantling/Demolition Initial Inspection

The Project Superintendent and a representative from the Government shall inspect the structure to determine the following:

- a. Federal, State and local authorities have been notified in writing of the nature and schedule of the work
- b. State of Montana, U-Dig have been contacted 48 hours in advance of work and assigned a site specific number (800)551-8344
- c. Utilities have been properly disconnected or isolated from the structure
- d. Building contents have been removed from the structure
- e. Hazardous materials have been removed from the structure
- f. Adequate water supply is available for dust control
- g. The structure and work area have been thoroughly soaked with water prior to start of work to mitigate the potential dust hazard

- h. The Government has granted permission to proceed with dismantling and controlled demolition of the structure
- i. The crew has been briefed as to the steps required to conduct a safe demolition of the structure
- j. The water trucks are properly staged to provide adequate water spray throughout the structure during dismantling/demolition
- k. Dust control measures using the boom lifts are in place to provide water spray over the top of the structure
- l. The area surrounding the structure has been secured and no authorized persons or equipment shall be allowed inside during the demolition process
- m. Erosion control devices (SEE Erosion Control Plan) are properly secured at the down gradient side of the structure to prevent the dust control water from migrating off site during the dismantling/demolition process
- n. Equipment and personnel are staged at a horizontal distance equal to 1.5 times the vertical height of the structure with the exception of the excavators
- o. The structure has been thoroughly washed with water to assist in dust control during structural dismantling and demolition
- p. The underground tunnels have been thoroughly decontaminated by pressure washing and all materials from the mushroom operation have been removed and properly stored for transportation and disposal at the Abandoned Vermiculite Mine (Mine)

#### 5.2 - Dismantling/Demolition Process

The dismantling/demolition process may begin upon completion of the Initial Inspection by the Project Superintendent and approval from the Government. Proper documentation of the Initial Inspection shall be provided in the project files.

Structural dismantling and controlled demolition of the each structure shall be done using the excavators with thumb and shear attachments, bulldozers, and wheel loaders under constant water spray. Dust control using water spray shall be done with a 1 1/2" fire hose attached to the water line from Rainy Creek Road. Additional Dust Control shall be done using 2,000-gallon water trucks staged near the excavators. Water shall be sprayed from personnel in the boom lifts spraying down onto the structures and from ground surface near the excavators. The dismantling and controlled demolition process shall be halted in the event visible dust is generated. The dust control measures shall continue until the dust disperses or has settled under the constant water spray. The demolition process may begin again when the dust has dissipated.

The excavator with shears shall cut cross members and beams while the excavator with thumb assists with pulling the structure down. This process shall continue until the entire structure has been brought to the ground.

The excavator with shears shall begin processing the debris and sizing for loading, transportation and disposal at the Abandoned Vermiculite Mine (Mine). Steel and wood components of each structure shall be cut to a maximum of 4' x 4' pieces to ease placement into end dump trucks for transportation to the Mine. The processed demolition debris shall be stock piled on each structure's footprint until loading begins allowing free standing water in the demolition debris to percolate through the debris pile and be captured on the concrete slabs and within the erosion control measures adjacent to each structure.

Loading end dump trucks with the demolition debris shall be done using the excavators with thumb attachment and wheel loaders. All work shall be done under constant air monitoring and water spray.

While the excavator with shear attachment is processing the demolition debris, the excavators with thumbs shall be demolishing the remaining structures. The wheel loaders and bulldozers shall be used to demolish and process structures other than the West Shed and Long Shed.

Demolition of the concrete tunnels shall occur following demolition of the Long Shed. A 3:1 slope shall be excavated to access the concrete tunnel underneath the north and west edge of the Long Shed. Excavation spoils shall be staged onto the asphalt slab in preparation of transportation and disposal at the Abandoned

Vermiculite Mine (Mine). The excavator with pulverizer shall gain access to the top of the concrete tunnel where it shall be staged. The excavator shall extend the pulverizer to the exposed end of the tunnel while staged on top of the tunnel. The pulverizer will be engaged and crush the concrete tunnel and move back along the length of the tunnel until complete. Crushed concrete shall be allowed to remain inside the tunnel and backfilled upon completion.

Strict adherence to the approved Site Health and Safety Plan shall be employed at all times during the dismantling and demolition phase of the work.

### 5.3 – Dismantling/Demolition Sequence

The sequence of the dismantling/demolition work is as follows:

- a. Parker residence
- b. Greenhouses
- c. West Shed
- d. Long Shed
- e. Concrete Tunnels
- f. Concrete slabs
- g. Asphalt paving

The concrete tunnels, concrete slabs, and asphalt paving shall be demolished in conjunction with the Excavation Phase of work. Approximately 4,500 cubic yards of overburden must be removed to expose the tops of the concrete tunnels adjacent to the Long Shed and West Shed. In an effort to expose the tunnel underneath these structures, a 3:1 sloped excavation shall be required. The resulting excavation will encroach upon the access route east of the Long Shed, and the footprint of the West Shed and the greenhouse located due north. This substantial activity should be done in conjunction with the excavation activities scheduled for Phase III (Greenhouse and West Shed Area) and Phase IV (Parker Residence and Long Shed Area) (SEE Earthwork/Excavation Plan).

**APPENDIX B**

**EARTHWORK/EXCAVATION PLAN**

## EARTHWORK/EXCAVATION PLAN

### 1.0 – Description

This plan describes the procedures to be employed by MARCOR during earthwork and excavation of asbestos contaminated soils at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2) in Libby, Montana.

### 2.0 – Materials

The approved erosion control plan shall be in place prior to initiating the earthwork/excavation plan.

### 3.0 – Personnel

Equipment operators  
Technicians  
Truck Drivers

### 4.0 – Equipment

Excavators with progressive linkage thumbs  
Bulldozers  
Backhoes  
Wheel Loaders  
Water Trucks  
Pressure Washers  
End Dump Trucks  
Articulating Dump Trucks  
Bottom Dump Trucks

### 5.0 – Procedures for Earthwork/Excavation

The site shall be divided into a grid pattern. Surface soil samples shall be collected from each grid and analyzed for asbestos using methodology acceptable to the Government. Volpe Center will prepare the Soil Sampling Plan. The results of the Soil Sampling Plan shall be plotted onto the Earthwork/Excavation Drawing by the Contractor. The Contractor shall receive a copy of the Excavation Drawing that shall illustrate the areas where soil is to be removed.

#### Earthwork/Excavation Initial Inspection

The Project Superintendent and a representative from the Government shall inspect the structure to determine the following:

- a. Federal, State and local authorities have been notified in writing of the nature and schedule of the work
- b. State of Montana, U-Dig have been contacted 48 hours in advance of work and assigned a site specific number (800)551-8344
- c. Erosion Control measures are in place and in good condition
- d. Utilities have been properly disconnected or isolated from the area to be excavated
- e. Adequate water supply is available for dust control
- f. The excavation work area has been thoroughly soaked with water prior to start of work
- g. The Government has granted permission to proceed with excavation in the specific grid
- h. The crew has been briefed as to the steps required to conduct a safe excavation of the grid
- i. The water trucks are properly staged to provide adequate water spray over the excavation area to control dust

- j. The grid to be excavated has been secured and no unauthorized persons or equipment shall be allowed inside during the excavation process
- k. Hay bales are properly staged at the down gradient side of the grid to prevent rain water from transporting potentially contaminated material off site after each shift
- l. Equipment and personnel are staged outside of the swing area of the excavators
- m. Equipment and personnel are staged outside of the loading zone for the articulating dump trucks
- n. The soil stock pile area has been prepared to receive excavated soils using hay bales to construct a berm around the perimeter of the area
- o. Dust control measures are available at the soil stock pile area
- p. Stock Pile management equipment and personnel are prepared to receive excavated materials
- q. Trees to be removed shall be clearly marked with fluorescent orange flagging prior to the start of work in any grid where trees are located
- r. Trees to be protected in place shall have excavation done by rubber tire backhoe or hand around surface roots to prevent damage to trees to remain in place

The earthwork and excavation process may begin upon completion of the Initial Inspection by the Project Superintendent and approval from the Government. Proper documentation of the Initial Inspection shall be provided in the project files.

#### Earthwork/Excavation Work

The results of the Soil Sampling Plan plotted on the Excavation Plan shall provide guidance as to the grids to be removed. The readiness of the operations at the soil stockpile management areas shall govern the sequence of the grids to be removed. The following shall govern the earthwork/excavation process at all times unless the Project Manager or the Government changes it in writing:

- a. All personnel must be briefed by the Site Superintendent or his designee of the days work and these procedures before being allowed to begin their work shift
- b. Each excavation work crew shall consist of one excavator operator, one water truck driver, one or two articulating dump truck driver(s), and one or two laborers
- c. Excavation of soils shall be performed using excavators cutting soils to a depth of 18 inches.
- d. Excavator buckets shall have cutting edges, no teeth (steel plates shall be welded to the teeth)
- e. Personnel and equipment shall be staged on undisturbed soil and will not enter excavated areas without obtaining permission from the Site Superintendent or clearance from the Health and Safety Officer
- f. Personnel and equipment shall be staged upwind of the work area whenever possible to reduce the risk of exposure to airborne asbestos fibers
- g. Excavators shall pull the soils towards the machine and create a small spoils pile from which it will load each dump truck
- h. Constant water spray using the fire hoses on the water trucks shall be applied to the cutting edge of the excavator bucket at times while the cutting edge of the excavator bucket is in motion and in contact with the soil
- i. The water truck driver and excavator operator shall be in radio contact with each other at all times
- j. The water truck driver and excavator operator shall maintain a clear field of vision between themselves at all times except when the water truck needs to obtain a load of water
- k. Articulating dump truck operators shall not approach the excavator and water truck driver until they are given permission to do so by radio contact from the excavator operator
- l. Haul routes for the articulating dump trucks shall be over undisturbed areas or over a clean corridor (ref. Temporary Facilities Plan)
- m. Soil stockpile areas are prepared to receive soils using an area on asphalt or concrete
- n. If visible dust emissions occur, then the operation shall stop while the water truck operator sprays the dust from an upwind position



## Earthwork/Excavation Sequence

The site shall be divided into a grid and each grid shall be approximately 100 feet square. There are approximately 73, 100 foot square grids within the 16.7 acre site (rationale: 16.7 acres x 43,560 sq. ft. per acre equals 727,452 sq. ft. divided by 10,000 sq. ft. equals 72.7, 100 foot square grids or 73 grids). Long Shed square footage is 39,200. The volume of soil subtracted for the Long Shed area is 2,722 CY. In an effort to protect clean areas from becoming cross contaminated from rain water run off flowing from potentially contaminated areas to clean areas, up gradient grids shall be done before progressing onto down gradient grids.

The work associated with the Earthwork/Excavation Plan shall be divided into 7 Phases. These Phases shall be approximately 200 feet wide running from Highway 37 to the Kootenai River. A description of each area is as follows (SEE EARTHWORK/EXCAVATION DRAWING):

Phase I – Open Pasture Area. There are approximately 8 grids in this Phase. Phase I is located on the northeastern corner of the property and on a line 200 feet south along Highway 37, then on a 90° angle 400 feet west to the bank of the Kootenai River. This area encompasses the open pasture and is bounded on the south by the greenhouses, west by the Kootenai River, the north by property boundary, and the east by the right-of-way of Highway 37.

Phase I totals approximately 80,000 square feet, or 1.83 acres. There are approximately 4,428 cubic yards of potentially asbestos contaminated soils in Phase I. At 750 cubic yards per day, Phase I should be completed in 6 days.

Phase II – Greenhouse Area. There are approximately 10 grids in this Phase. Phase II is located inside a line running south along Hwy 37 200 feet from the end point of Phase I, then on a 90° angle 500 feet west to the bank of the Kootenai River. This work phase encompasses the greenhouses and is bounded on the south by the pump house area, west by the Kootenai River, the north by the open pasture, and the east by the right-of-way of Highway 37.

Phase II totals approximately 100,000 square feet, or 2.29 acres. There are approximately 5,542 cubic yards of potentially asbestos contaminated soils in Phase II. At 750 cubic yards per day, Phase II should be completed in 8 days.

Phase III – Pump House and West Shed Area. There are approximately 12 grids in this Phase. Phase III is located inside a line running south along Hwy 37 200 feet from the end point of Phase II, then on a 90° angle 500 feet west to the bank of the Kootenai River. This work phase encompasses the pump house and West Shed and is bounded on the south by the Parker residence area and Long Shed, west by the Kootenai River, the north by the greenhouse area, and the east by the right-of-way of Highway 37 and the main gate.

Phase III totals approximately 120,000 square feet, or 2.75 acres. There are approximately 6,665 cubic yards of potentially asbestos contaminated soils in Phase III. At 750 cubic yards per day, Phase III should be completed in 9 days.

Phase IV – Parker Residence and Long Shed Area. There are approximately 17 grids in this Phase. Phase IV is located inside a line running south along Hwy 37 to Rainy Creek, then west to the bank of the Kootenai River. This work phase encompasses the Parker residence and Long Shed and is bounded on the south by Rainy Creek, west by the Kootenai River, the north by the pump house and West Shed area, and the east by the right-of-way of Highway 37 and the main gate.

Phase IV totals approximately 170,000 square feet, or 3.90 acres. There are approximately 9,436 cubic yards of potentially asbestos contaminated soils in Phase IV. At 750 cubic yards per day, Phase IV should be completed in 13 days.

The Long Shed Area shall be done during Phase IV of the Excavation Work. Currently, all phases consider an 18" cut. If the option of demolishing the concrete tunnels is selected, then the Long and West Shed area cut shall be increased from 18" to 10 feet to access the tops of the concrete tunnels. If the tunnels are slurry filled, then a cut of 18" may be adequate. If there is more than 18" of vermiculite located around the Long and West Sheds, then the final cut will not be known until verified in the field.

Phase V – Grave and Cross Area. There are approximately 15 grids in this Phase. Phase V is located inside a line running due south along the Wise Property, then due west to the bank of the Kootenai River. This work phase encompasses the grave and cross and is bounded on the south by pump house property owned by Mark Owens, west by the Kootenai River, the north by the horse pasture, and the east by the Wise Property.

Phase V totals approximately 150,000 square feet, or 3.44 acres. There are approximately 8,331 cubic yards of potentially asbestos contaminated soils in Phase V. At 750 cubic yards per day, Phase V should be completed in 12 days.

Phase VI – Horse Pasture Area. There are approximately 10 grids in this Phase. Phase VI is located inside a line running 200 feet south along the Hwy 37 from Rainy Creek, then west 600 feet to the bank of the Kootenai River. This work phase encompasses the horse pasture and is bounded on the south by the Grave and Cross Area, west by the Kootenai River, the north by Rainy Creek, and the east by the Wise Property.

Phase VI totals approximately 100,000 square feet, or 2.29 acres. There are approximately 5,554 cubic yards of potentially asbestos contaminated soils in Phase VI. At 750 cubic yards per day, Phase VI should be completed in 8 days.

Phase VII – Clean Corridor and Haul Road Area. There are no grids in this Phase or work. Phase VII consists of the clean corridor and haul roads used during the course of work. This work phase shall be performed last. Starting with the farthest point on the clean corridor haul roads and working towards the front of the property (ref. Temporary Facilities Plan). The Clean Corridor and Haul Roads are approximately 2,500 feet in length and average 20 feet wide.

If 6 inches of clean imported crushed stone are placed onto this road right-of-way to provide a clean corridor for onsite and offsite trucking and an 18" cut into undisturbed soil is required, then Phase VII totals approximately 3,704 cubic yards. At 750 cubic yards per day, Phase VII should be completed in 5 days.

The grids that are located near the north and east boundary of each Phase shall be excavated first. The excavation process shall begin inside the up gradient grids. Excavators shall stage facing Highway 37. The excavators shall be working in the manner described above and move in a southerly direction, then back to the northern boundary of the grid or to the next undisturbed area within the grid until the entire grid is removed. Then the excavator shall move back to the edge of the grid nearest the northern boundary of the grid or to the undisturbed area of the grid and again move in a southerly direction. It is anticipated that each grid shall be approximately 100 feet in length. Upon completion of the first grid, the excavation shall begin the adjoining grid to the south of the preceding grid running parallel to Highway 37. Removing the soil in this manner and sequence shall assist in the prevention of cross contaminating grids from rain water as the grids are cleared from up gradient to down gradient. Excavating the soil in this manner shall also make ready a large onsite storage area for the importing of backfill materials. This work shall be considered clean work provided air monitoring and soil sampling results indicate a clean area. Access to the property for the clean backfill work shall be through the gate currently located at the northeast corner of the Greenhouse Area (ref. Temporary Facilities Plan).

The backfill process may begin when an entire Phase is deemed clean from confirmatory sample results. Imported backfill shall be delivered in bottom dump trucks. A CAT D8 bulldozer, water trucks and CAT 140G Motor Grader shall be used to spread and compact the imported materials. Compaction should not be excessive so that seeds may germinate and plant growth may easily take root.

**APPENDIX C**  
**TRANSPORTATION/DISPOSAL**

## TRANSPORTATION AND DISPOSAL PLAN LIQUID HAZARDOUS WASTE MANAGEMENT PLAN

### 1.0 – Description

This plan describes the work that shall consist of providing the necessary Transportation and Disposal services and Liquid Hazardous Waste Management procedures required during time critical emergency removal actions at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2).

This plan provides the details for the required materials, equipment, and personnel, including establishing the locations for Temporary Storage, Transportation and Disposal of Hazardous Waste, Non-Hazardous Waste, Liquid Hazardous Waste, onsite Hazardous Materials, Asbestos Containing Materials, asbestos contaminated soils, and asbestos contaminated demolition debris for the project.

### 2.0 – Materials

- a. Shipping containers
- b. Packing materials
- c. Absorbent materials
- d. 6 mil plastic
- e. Labels
- f. Permanent ink markers
- g. Placards
- h. Manifests
- i. Bill of Lading
- j. Land Disposal Restrictions
- k. Waste Profiles
- l. Hay bales

### 3.0 – Personnel

Chemist  
Laborers  
End Dump Truck Drivers  
Hazardous Waste Transporters  
Water Truck Drivers

### 4.0 – Equipment

- a. Haz cat kit
- b. Photoionization unit
- c. LEL/O2 Meter
- d. Forklift
- e. Excavators
- f. Loaders
- g. Hazardous waste transport vehicles
- h. End dump trucks
- i. Articulating Dump Trucks

## 5.0 – Preparation

### 5.1 - EPA Identification Numbers

The Government shall obtain a site EPA Identification Number prior to initiating any transportation and disposal activities. Transportation companies shall provide their EPA Identification Number prior to initiating any transportation and disposal for this project. Disposal facilities shall provide their EPA Identification Numbers prior to initiating and transportation and disposal for this project.

### 5.2 - Abandoned Vermiculite Mine Disposal Site

The Mine is not recognized as a licensed disposal facility. The Federal Government has directed the Contractor to dispose of the asbestos contaminated soils and demolition debris at the Mine and agrees to indemnify and hold harmless the Contractor from any liability whatsoever that may arise from using the Mine as a disposal facility for this project.

Rainy Creek Road shall be treated with a dust suppressant prior to initiating transportation and disposal to the Mine (See Dust Control Plan).

### 5.3 - Shipping Documents

A State of Montana approved Bill of Lading shall be used as transportation and disposal documentation for waste that is deposited at the Mine. The Bill of Lading shall document the site, and transporters EPA Identification Number, truck number, estimated load volume in cubic yards, drivers signature, Mine operators signature, date and time of disposal. Truck drivers shall be required to be licensed in the State of Montana, insured, hazardous waste endorsements, and trained in accordance with 29 CFR 1910.120, 1910.1101 and 40 CFR Part 763. Documentation of this training shall be submitted to the Contractor for review and acceptance prior to the start of work. Truck drivers shall be subject to the rules, regulations and requirements identified in the Site Health and Safety Plan and imposed by the Contractor's Standard Operating Procedures and subcontractor requirements.

Shipping documents for waste disposal at an off site facility shall comply with all Federal, State and Local requirements. Uniform Hazardous Waste Manifests, Waste Profiles, Land Disposal Restriction (LDR) forms shall be used for shipments of hazardous waste from OU2. The transportation and disposal subcontractor shall be required to fulfill all provisions of the Prime Contract and the Contractor's standard operating procedures and subcontractor requirements.

## 6.0 – Procedures

### 6.1 - Hazardous Waste

Hazardous waste shall be sorted and stored by hazard classification in the temporary hazardous waste storage area (ref. Temporary Facilities Plan). The chemist shall sort the hazardous waste so that it can be prepared for shipment in proper containers. All hazardous material, or suspected hazardous materials, and hazardous waste shall be removed from each structure, segregated by hazard classification, and prepared for transportation and disposal prior to the start up of any dismantling/demolition activity. No dismantling/demolition work will be allowed on any structure until the hazardous materials or suspected hazardous materials have been removed from the structure to be dismantled or demolished. Haz Cat. packaging, labeling, preparation of shipping documents, transportation and disposal of this hazardous material or suspected hazardous material may occur at a later date provided the temporary storage does not exceed 90 days and is in a safe location away from dismantling/demolition activities

## 6.2 - Non-hazardous Waste

Salvageable inventoried property shall be removed from OU2 and stored at an offsite location. Non-salvageable inventoried property shall be discarded and treated as asbestos contaminated material. A licensed appraiser prior to determining its final disposition shall appraise personal property at OU2. The Government shall direct the Contractor as to the final disposition of appraised personnel property.

## 6.3 - Liquid Hazardous Waste

The Chemist shall determine the locations of liquid hazardous waste. Liquid hazardous waste shall be managed in the same manner described for "Hazardous Waste" (see above).

## 6.4 - Asbestos Containing Materials

In the event Regulated Asbestos Containing Materials are encountered and require transportation and disposal to an offsite facility, then the Contractor shall prepare the RACM for offsite transportation and disposal. The best value for a licensed disposal facility for RACM shall be determined using procurement policies and procedures acceptable to the Government.

## 6.5 - Asbestos Contaminated Soils

Asbestos contaminated soils shall be transported and disposed at the Abandoned Vermiculite Mine (Mine) using licensed, trained, insured, and lined semi-tractor trailer end dump trucks. Asbestos Contaminated Soils shall be excavated and loaded onto articulating dump trucks, stockpiled at the Greenhouse slab, Long Shed slab, and asphalt pad in the horse pasture (ref. Temporary Facilities Plan). Stockpiles shall be maintained using a CATD8 bulldozer and water trucks. Stockpiles shall be covered at the end of each shift using 6-mil plastic or treated with an approved dust suppressant chemical.

Semi-tractor trailer end dump trucks shall be allowed to access the stockpiles using a clean corridor haul road constructed of 5/8" crushed and screened stone (ref. Temporary Facilities Plan). The end dump trucks shall approach each loading area where technicians shall line the dump truck bed with 6-mil plastic. A CAT 966 (or equal) rubber tire wheel loader shall load the trucks under constant water spray. Once the end dump is loaded, the truck shall proceed back to the truck preparation facility where technicians shall wrap the plastic liner (burrito wrap) and allow the truck to extend its water tight tarp over the entire load. The Contractor shall have a prepared Bill of Lading that the driver shall sign, and a representative from the Government shall sign as the generator. The loaded end dump truck shall be allowed to exit the site over the clean corridor haul roads and in accordance with the Traffic Control Plan.

The loaded trucks shall proceed to the Mine using Rainy Creek Road. The end dump trucks shall be directed by the operators of the Mine as to where the load is to be placed. Once the end dump is empty, the truck shall proceed to the Mine decontamination facility and wash down (ref. Temporary Facilities Plan). A representative of the Mine operations shall sign the truck driver's Bill of Lading and exit the decontamination facility.

## 6.6 - Asbestos Contaminated Demolition Debris

Asbestos contaminated demolition debris shall be handled in the same manner as the asbestos contaminated soils with one exception (ref. Asbestos Contaminated Soils above). The exception shall be the debris shall not be wrapped in plastic or tarped. Demolition debris consists of many sharp objects and wrapping each load prior to transportation and disposal at the Mine would result in damage to the plastic and tarp over the load. Prior to loading out the demolition debris, the debris pile shall be thoroughly soaked to wash away any remaining dust for the short trip to the Mine.

**APPENDIX D**  
**EQUIPMENT DECONTAMINATION PLAN**



## EQUIPMENT DECONTAMINATION PLAN

### 1.0 – Description

This plan describes the work that shall consist of furnishing the necessary equipment decontamination facilities and procedures, including all materials, equipment, and personnel required to install the equipment decontamination facilities at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2).

### 2.0 – Materials

- a. 5/8" screened crushed stone
- b. sand
- c. 20 mil plastic
- d. hay bales
- e. Existing concrete and asphalt surfaces

### 3.0 – Personnel

Laborers  
Equipment operators  
Water truck drivers  
End Dump Truck Drivers

### 4.0 – Equipment

Water trucks  
Sump pumps  
Pressure washers  
Hand tools  
Water hoses

### 5.0 – Preparation

Preparation shall include all the work required to make ready the areas or locations for the Equipment Decontamination Facilities. The locations of the equipment decontamination facilities are shown on the Temporary Facilities Drawing.

### 6.0 – Installation

Installation of the Temporary Facilities shall be done in accordance with the details shown on the Temporary Facilities Drawing.

### 7.0 – Procedures

Equipment used to dismantle, demolish, excavate or otherwise come into contact with potentially contaminated soil or debris must be decontaminated before leaving the site or coming into contact with clean areas including the clean corridor haul roads.

Decontamination procedures shall include washing with a pressure washer or water hose all surfaces of equipment that come into contact with potentially contaminated soil or debris.

A sample taken from the dashboard area of each piece of equipment brought to the site shall be used to determine background concentrations. When equipment is decontaminated and prepared for demobilization, a second sample taken from the same area shall determine the completeness of the decontamination procedure employed.

Pressurized or compressed air shall not be used to decontaminate equipment.

Temporary decontamination facilities shall be allowed on existing concrete or asphalt surfaces that are adjacent to areas that contain potentially contaminated soil. These temporary decontamination facilities are shown on the Temporary Facilities Drawing. This will allow access to contaminated soil stockpiles, contaminated debris stockpiles, and areas throughout the site by way of the clean corridor haul roads and these temporary decontamination facilities. This will provide for a more efficient and rapid decontamination of equipment.

A fixed decontamination facility shall be installed near the entrance of the site adjacent to the "Guest House" trailer. This facility shall be constructed as described in the Temporary Facilities Plan. This facility shall be used only by equipment departing the site. It shall not be necessary to install this fixed decontamination facility until Phase IV of the Earthwork/Excavation Drawing has been completed.

A decontamination facility shall be installed at the Mine. This facility shall be constructed as described in the Temporary Facilities Plan. It shall consist of a water storage tank; a gravity feed water line to a gasoline powered pressure washer. The truck drivers shall operate this facility as the trucks exit the Mine disposal site.

## TRAFFIC CONTROL

### 1.0 – Description

This plan describes the work that shall consist of furnishing and applying the necessary traffic control materials, equipment, personnel and materials, including establishing the locations for traffic control materials at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2).

### 2.0 – Materials

#### Traffic Signs

- a. Trucks Entering
- b. Construction Zone Ahead
- c. Reduced Speed Ahead
- d. Fines Doubled in Work Zones
- e. Construction Zone Speed Limit 45 MPH
- f. End Speed Zone
- g. End Construction
- h. Flagmen Ahead
- i. Prepare to Stop
- j. Concrete K-rails

### 3.0 – Personnel

Laborers – Flagmen, Traffic Control

### 4.0 – Equipment

Hand held radios

Hand held stop and slow signs

### 5.0 – Preparation

Preparation shall include all the work required to make ready the areas or locations for the traffic control signs. The locations of the traffic control signs are shown on **Traffic Control Drawing**. Notification of the State of Montana, Department of Transportation, Traffic Engineering Division, Missoula, Montana shall be made prior to initiating the traffic control plan. The Montana DOT District Traffic Control Engineer is Darren Kaufman (406) 523-5800.

Notification shall be made to local law enforcement of the scheduled work activities and required traffic control. Local law enforcement shall be made aware of reduced speed limits in the construction zone.

### 6.0 – Installation

Installation of the traffic control signs shall be done in accordance with the details shown on **Traffic Control Drawing**.

## 7.0 – Procedures

The scheduled time critical asbestos removal operations at OU2 include the use of semi-tractor trailer end dump trucks to transport asbestos contaminated demolition debris and soils from OU2 to the Abandoned Vermiculite Mine (Mine). This activity will necessitate these loaded semi-tractor trailer end dump trucks to cross Highway 37 at a maximum frequency of every 6 minutes. Emptied semi-tractor trailer end dump trucks shall be returning from the Mine at a maximum frequency of every 6 minutes. These trucks shall be controlled by flagmen staged at the road crossing of Highway 37 and Rainy Creek Road that shall control the semi-tractor trailer end dump trucks by radio and hand held stop signs. Traffic control personnel shall be staged at the hill on Highway 37 east (approximately 600 feet) of the intersection and 1000 feet to the west. Traffic Control personnel shall have hand held radios having the same frequency used for the site communications. Semi-tractor trailers shall be allowed to cross Highway 37 when traffic control personnel announce that public traffic is not approaching the intersection from the east or west.

Loaded trucks have right-of-way. However, this may not be practical on steep grades. It is very difficult and dangerous to back a truck up a steep grade. Therefore, truck drivers shall call out their departure from the Mine before leaving allowing loaded trucks coming up the haul road to announce their location and stop the empty truck from leaving the Mine.

The actual number of trucks hauling debris or soil to the Mine may vary. Currently, MARCOR's Task Order 5 has a line item for 4 end dump trucks for one month. The intention is to accumulate enough of a stockpile of debris or soil or both to keep these 4 trucks hauling continuously for the one-month period. Otherwise, the effort would be an inefficient expenditure of funds.

**APPENDIX E**  
**TRAFFIC CONTROL**

**APPENDIX F**  
**DUST CONTROL**

## DUST CONTROL PLAN

### 1.0 – Description

This plan describes the work that shall consist of furnishing and applying the necessary dust control materials, equipment, and personnel, including establishing the locations for dust control materials at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2) in accordance with Drawing C3.

### 2.0 – Materials

- a. Water from Rainy Creek
- b. Water from the Kootenai River
- c. 1 ½" fire hoses
- d. ¾" garden hoses
- e. Fire hose nozzles
- f. 4" PVC pipe
- g. 4" rubber boot
- h. Magnesium chloride, Lignin or Soil Sement (® of Midwest Industrial Supply)

### 3.0 – Personnel

Laborers  
Water Truck Drivers

### 4.0 – Equipment

6" water pump  
6" Water Truck Loading Tower with Rubber Boot  
Water trucks  
Modified water trucks for application of liquid chemical dust suppressant  
CAT 140G Motor Grader with rippers

### 5.0 – Preparation

Preparation shall include all the work required to make ready the areas or locations for the dust control measures. The locations of the dust control measures are:

- a. At all heavy equipment and other work activities involving structural dismantling/demolition and earthwork
- b. Rainy Creek Road from Highway 37 to the Abandoned Vermiculite Mine (Mine)
- c. At locations where the generation of dust emissions is likely or suspected

Preparation of Rainy Creek Road using applied dust suppressants may include the use of a CAT140G Motor Grader with rippers to scarify the first 6" of the road base. The modified water trucks would apply the dust suppressant. Then the CAT140G Motor Grader would blend the road base materials that contain the dust suppressant and level. The treated area would be allowed to cure for 24 hours. This procedure would apply to using a dust control measure other than magnesium chloride.

### 6.0 – Application

- a. Dust control measures using water trucks and hoses with a spray directly at the point where equipment contacts any structure or soil
- b. Preparation and placement of magnesium chloride, Lignin or Soil Sement ® onto Rainy Creek Road

- c. Preparation and placement of magnesium chloride, Lignin or Soil Sement ® onto stock piles
- d. Preparation and placement of magnesium chloride, Lignin or Soil Sement ® onto topsoil to protect against soil erosion from wind or rain

#### 7.0 – Procedures

Air monitoring results or visual inspections may dictate modification to this dust control plan or require the use of additional dust control measures.

At the beginning of each work shift and prior to the start up of any dismantling/demolition or earthwork, water shall be applied to all surfaces within the work areas. Water shall not be allowed to pond except during the dismantling/demolition phase of work.

Onsite water trucks shall be loaded by the 4" water pump and 4" water tower located at the Kootenai River. Water trucks used on clean areas, or on topsoil shall be required to obtain water using a clean corridor to the location of the water outlet from Rainy Creek Road shown on the Temporary Facilities Plan.

Dust control provided using hand held 1 ½" fire hoses shall be connected to the existing water line from Rainy Creek Road. Additional 1 ½" fire hose shall be connected to the 4" water pump and water supplied by the Kootenai River.

At the beginning of each work shift, the water trucks shall apply water to the clean corridor haul roads before onsite traffic is allowed to use the onsite haul roads.

There shall be at least two water trucks onsite and in operation at all times. One water truck shall stay on the clean corridor haul roads and avoid contacting any potentially contaminated soils. The second water truck shall be assigned work adjacent to operating heavy equipment so as to provide dust control whenever and wherever heavy equipment is operating. Additional water trucks may be necessary to allow a smooth and uninterrupted operation at all work locations.



**APPENDIX G**  
**EROSION CONTROL**

## EROSION CONTROL

### 1.0 – Description

This plan describes the work that shall consist of furnishing and applying the necessary erosion control materials, including preparing areas to receive erosion control materials at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2).

### 2.0 – Materials

Materials shall comply with the Remedial Action Work Plan developed by John A. Volpe Transportation Systems Center and Technical Specifications, Section 02270, Sedimentation and Erosion Control.

The required materials are as follows:

Prefabricated commercial silt fence  
Hay bales  
Stakes

### 3.0 – Personnel

Laborers  
Equipment Operators  
Water truck drivers

### 4.0 – Equipment

Backhoe  
Water trucks

### 5.0 – Preparation

Preparation shall include all the work required to make ready the areas or locations for the erosion control structures. The locations of the erosion control structures are shown on **DRWG C3**.

### 6.0 – Installation

Installation of the silt fence shall be done in accordance with the details shown on **DRWG C3**.

Installation of hay bales shall be done in accordance with the details shown on **DRWG C3**.

#### Punched Straw

The spreading of hay bales onto topsoil followed by tracking over the hay thereby punching the straw into the topsoil with the tracks. This provides a barrier to topsoil from wind, rain, and runoff that will support the hydroseeding phase of work. Areas where punched straw is to be used shall be in an area approximately 100' wide that adjoins the Kootenai River and Rainey Creek. This will provide a "buffer zone" that would assist in retaining topsoil in place before topsoil is transported into the silt fence and potentially into the river or creek.

## 7.0 – Procedures

### Initial Inspection

The Project Superintendent shall inspect the site with the Project Engineer (Government Representative) to determine the following:

- a. Existing areas onsite where scouring has occurred
- b. Existing areas onsite where sheet flow will likely occur during heavy rainfall
- c. Existing locations of storm water management devices such as culverts, storm drains, pounds, and diversions
- d. Existing locations of rock structures such as rock check dams, or riprap protected slopes
- e. Review of the Drawings to determine the topography of the site and the location of the erosion control structures
- f. Inspect the materials imported to the site for erosion control
- g. Identify trees near property lines, the Kootenai River, and Rainy Creek that are to be protected in place and remain on the property with fluorescent orange flagging that shall be removed prior to installation of the erosion control structures

Upon completion of the Initial Inspection for the Erosion Control Plan, the Contractor and the Government shall agree on the strategic locations of the erosion control devices.

### Preliminary Inspection

Inspection of the erosion control structures before and during the Dismantling, Demolition and Earthwork phases of work. Preliminary Inspections shall be done at least once per week or after a rainstorm and documented by the Contractor.

The Project Superintendent shall inspect the erosion control structures with the Project Engineer (Government Representative) to determine the following:

- a. The condition of the existing erosion control structures
- b. Determine if erosion control structures are in need of repair or replacement
- c. Determine if site conditions warrant installing additional erosion control structures particularly on the down gradient edge of asphalt, concrete and clean corridor haul roads near the Kootenai River and Rainy Creek
- d. The condition of property, the Kootenai River and Rainy Creek to determine any visible change caused by or surface water run off from the Project Site

**APPENDIX H**  
**TEMPORARY FACILITIES**

## TEMPORARY FACILITIES PLAN

### 1.0 - Description

This plan describes the work that shall consist of furnishing the necessary temporary facilities, including all materials, equipment, and personnel required to establish the temporary facilities required for the time critical asbestos removal action at the former W. R. Grace and Company, Screening Plant (Operable Unit 02, OU2).

### 2.0 - Materials

- a. Crushed miscellaneous road base materials
- b. Utility hook ups
- c. Temporary chain link fence
- d. Onsite fuel storage tanks
- e. Onsite petroleum products
- f. Water pumps hook ups
- g. Hay bales
- h. Silt fence
- i. Project Sign
- j. Supplies - PPE, 6 mil plastic, etc.

### 3.0 - Personnel

Laborers  
Equipment operators  
Water truck drivers  
End Dump Truck Drivers

### 4.0 - Equipment

Office trailers  
Decon trailer  
Personal computers  
Facsimiles  
Copier machines  
Telephones  
Base radio station  
Hand held radios  
Portable toilets  
Portable storage containers  
Backhoe  
Dump trucks  
Water trucks  
Fuel pump  
Water pumps  
Wheel loader  
Pressure washers  
Hand tools

### 5.0 - Preparation

Preparation shall include all the work required to make ready the areas or locations for the Temporary Facilities. The locations of the temporary facilities are shown on the Temporary Facilities Drawing.

## 6.0 - Installation

Installation of the Temporary Facilities shall be done in accordance with the details shown on the Temporary Facilities Drawing.

Office trailers, decon trailer, and associated command post equipment shall be installed per manufacturer's recommendations or in accordance with the Removal Action Work Plan and technical specifications.

A clean corridor haul route shall be established and installed using crushed miscellaneous road base materials at the location shown on the Temporary Facilities Plan. This haul route shall be used for onsite traffic that must avoid contact with potentially contaminated soils. This onsite traffic shall include, but not be limited to, offsite trucking, water trucks, personnel, and equipment service vehicles. This clean corridor haul route shall be maintained throughout the life of the project.

Equipment decontamination shall be done at established decon facilities. Equipment decontamination may take place on concrete or asphalt surfaces that are adjoined by undisturbed areas to be excavated (ref. Temporary Facilities Drawing).

An equipment decontamination pad shall be constructed towards the end of the project so that equipment may be decontaminated prior to being demobilized from the site. The Equipment Decontamination Pad shall be constructed by excavating an area approximately 20' x 60' x 1'. A 3" layer of sand shall be placed and compacted inside the excavation. Then a 20-mil plastic liner shall be placed onto the compacted sand. Another 3" layer of sand shall be placed onto the plastic. The remainder of the excavation shall be filled with 5/8" screened gravel. A sump pump shall be placed into a well at the low end of the decon pad so that decontamination water may be collected. A small water tank and 5 micron filter system shall be staged to store and filter the decon water prior to being discharged as dust control water.

## 7.0 - Procedures

Installation of the Temporary Facilities shall be done at the locations shown on the Temporary Facilities Plan.

The office trailers shall serve as the Command Post for this project. All temporary facilities must be in place before initiating any structural dismantling, demolition, earthwork, and excavation except for the installation of the erosion control measures.

Temporary facilities shall be inspected daily by project personnel. Facilities requiring repair or replacement shall be given priority.

The Clean Corridor Haul Roads shall be washed daily using a water truck side spray nozzle and fire hose.

The temporary decon facilities shall be washed daily using a water truck side spray nozzle and fire hose. These temporary decon facilities shall be located adjacent to undisturbed areas to be excavated. Decon water at these locations shall be controlled using the approved erosion control measures. When it is no longer practical to decon equipment near areas to be excavated, the decon pad described in section 6.0 shall be installed.

Onsite storage of fuel shall be by trailer mounted fuel storage tanks. This will allow the removal and replacement of this critical item when excavation of the temporary storage area is required. This will also allow the fuel to be transported to the heavy equipment fueling areas as opposed to the heavy equipment tracking to the onsite fuel storage area.

Onsite storage of hazardous waste or waste that must be disposed at a location other than the Abandoned Vermiculite Mine (Mine) shall be transported offsite as soon as possible. Waste being disposed in this manner shall be given priority.

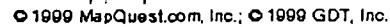
Where practical, the approved Erosion Control measures shall be in place before the placement of temporary facilities such as the clean corridor haul roads.

Temporary electrical power shall be provided by Flathead Electric. A temporary power pole shall be installed near the office trailers. Initial temporary power shall be from the panel located at the greenhouses.

Water shall be supplied to the office trailers from Rainy Creek through an existing line that has been flushed by a State of Montana licensed plumber.

Sanitary sewage generated from the office trailers shall be collected in onsite storage tanks and pumped weekly by a septic system pumping service. Portable toilets provide additional sanitary services. These portable toilets shall be located near the decon trailer so that crewmembers may access the facilities after going through the decon trailer.

A decon trailer with a dirty room, shower room (with 4 showers), and clean room (with lockers) shall be located near the office trailers. Water from the decon trailer shall be collected and filtered before being transported by the septic pumping service.





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Requirements (29CFR 1910.120)

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## I. DISCUSSION

A. Title 29, Code of Federal Regulations, Part 1910.120, describes what is required by law involving Hazardous Waste Operations and Emergency Response.

1910.120 is applicable to all employers and employees engaged in the following operations:

1. Hazardous substance response operations including initial investigations at CERCLA sites under the Comprehensive Emergency Response Compensation and Liability Act (CERCLA).
2. Major corrective actions taken in clean-up operations under Resource Conservation and Recovery Act (RCRA) of 1976 as amended.
3. Operations involving hazardous waste storage, disposal, and treatment facilities regulated under 40 Code of Federal Regulations (CFR) Parts 264 and 265 pursuant to RCRA, except for small quantity generators and those employers with less than 90 days accumulation of hazardous wastes.
4. Hazardous waste operation sites that have been designated for cleanup by state or local governmental authorities.
5. Emergency response operations for releases of or substantial threats of such releases of hazardous substances and post-emergency response operations for such releases.

## C. General Requirements

The following is an overview of the components of Part 1910.120. Each of these components are described in more detail within.

1. **Safety and Health Program**  
Each employer shall develop and implement a safety and health program for its employees involved in hazardous waste operations. The program, as a minimum, shall incorporate the requirements of 1910.120 and be provided,

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as appropriate, to any subcontractor or its representative who will be involved with the hazardous waste operation. The program shall be designed to identify, evaluate, and control safety and health hazards and provide for emergency response for hazardous waste operations.

2. Site Characterization and Analysis  
Hazardous waste sites shall be evaluated to identify specific site hazards and to determine the appropriate safety and health control procedures needed to protect employees from the identified hazards.
3. Site Control  
Site control procedures shall be implemented before clean-up work begins to control employee exposure to hazardous substances.
4. Training  
Initial or refresher or review training shall be provided to employees before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety or health hazards.
5. Medical Surveillance  
Medical surveillance shall be provided for employees exposed or potentially exposed to hazardous substances or health hazards or who wear respirators.
6. Engineering Controls, Work Practices and Personal Protective Equipment  
Engineering controls, work practices, personal protective equipment, or a combination of these shall be implemented to protect employees from exposure to hazardous substances and health hazards.
7. Monitoring  
Monitoring shall be performed to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed established permissible exposure limits for hazardous substances.

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8. Informational Program  
Employees, contractors, and subcontractors or their representative shall be informed of the degree and nature of safety and health specific to the work site by using the safety and health plan.
9. Material Handling  
Hazardous substances and contaminated soils, liquids, and other residues shall be handled, transported, labeled, and disposed of in accordance with this regulation.
10. Decontamination  
Procedures for all phases of decontamination shall be developed and implemented in accordance with the requirements of this regulation.
11. Emergency Response  
Emergency response to hazardous waste operation incidents shall be conducted in accordance with the requirements of this regulation.
12. Illumination  
Areas accessible to employees shall be lighted in accordance with the requirements of this regulation.
13. Sanitation  
Facilities for employee sanitation shall be provided in accordance with this regulation.
14. Site Excavation  
Site excavations created during initial site preparation or during hazardous waste operations shall be shored or sloped to prevent accidental collapse and conducted in accordance with Subpart P of 29 CFR Part 1926.
15. Contractors and Sub-Contractors  
An employer who retains contractor or sub-contractor services for work in hazardous waste operations shall inform those contractors, sub-contractors, or their representatives of any potential fire, explosion, health or other safety hazards of the hazardous waste operation that have been identified by the employer.

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## II. DEFINITIONS

A. Buddy System

A system of employee organization so that each employee of the work group is designated to observe the activities of at least one other employee in the work group. The purpose of the buddy system is to provide quick assistance to other employees in the event of an emergency.

B. CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

C. Decontamination

The removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

D. Emergency Response (ER)

A coordinated response effort by employees from outside the immediate release area or by outside responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases that can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area are not considered emergency responses.

E. Established Permissible Exposure Limit (PEL)

The inhalation or dermal permissible exposure limit (PEL) specified in 29 CFR Part 1910, Subpart Z, or, if none is specified the exposure limit in "NIOSH Recommendations for Occupational Health Standards" dated September 1986 shall apply. If neither of the above is specified, the standards specified by the American Conference of Governmental Industrial Hygienists in their publication "Threshold Limit Values and Biological Exposure Indices for 1986-87" dated 1986 shall apply. Additionally, if none of the above is specified, a limit based upon a published study or MSDS shall apply.

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F. Hazardous Substance

Any substance designated or listed in items 1 through 4, below, exposure to which results or may result in adverse effects on the health or safety of employees:

1. Any substance defined under section 101(14) of CERCLA.
2. Any biological agent and other disease-causing agent as defined in section 104(a)(2) of CERCLA.
3. Any substance listed by the U.S. Department of Transportation (D.O.T.) and regulated as hazardous materials under 49 CFR 172.101 and appendices.
4. Hazardous waste.

G. Hazardous Waste

1) a waste or combination of wastes as defined in 40 CFR 261.3, or 2) those substances defined in 49 CFR 171.8.

H. Hazardous Waste Operation

Any operation involving employees exposure to hazardous wastes, hazardous substances, or any combination of hazardous substances that are conducted within the scope of this standard.

I. Hazardous Waste Site or Site

Any facility or location at which hazardous waste operations within the scope of this standard take place.

J. Health Hazard

A chemical, mixture of chemicals, or a pathogen for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants,

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corrosives, sensitizes, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

Further definition of the terms used above can be found in Appendix A to 29 CFR 1910.1200.

K. Immediately Dangerous to Life or Health (IDLH)

Any atmospheric condition that poses an immediate threat to life, or which is likely to result in acute or immediate severe health effects. This includes oxygen deficiency conditions.

L. Immediate Severe Health Effects

Any acute clinical sign or symptom of a serious, exposure-related reaction manifested within 72 hours after exposure to a hazardous substance.

M. Oxygen Deficiency

That concentration of oxygen by volume below which air supplying respiratory protection must be provided. It exists in atmospheres where the percentage of oxygen by volume is less than 19.5 percent oxygen.

N. RCRA

Resource Conservation and Recovery Act of 1976.

O. Site Safety and Health Officer

The individual located on a hazardous waste site who is responsible to MARCOR and has the authority and knowledge necessary to implement the Site Safety and Health Plan and verify compliance with applicable safety and health requirements.

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### III. PROCEDURE

#### A. Site Characterization and Analysis 1910.120(c)

1. A preliminary evaluation of a site's characteristics shall be performed prior to site entry by a trained person to aid in the selection of appropriate employee protection methods prior to site entry. During site entry, a more detailed evaluation of the site's specific characteristics shall be performed by a trained person, to further identify existing site hazards and to further aid in the selection of the appropriate engineering controls and Personal Protective Equipment (PPE) for the tasks to be performed.
2. All suspected conditions that may pose inhalation or skin absorption hazards that are IDLH or other conditions that may cause death or serious harm shall be identified during the preliminary survey and evaluated during the detailed survey. Examples of such hazards include, but are not limited to, confined space entry, potentially explosive or flammable situations, visible vapor clouds, or areas where biological indicators such as dead animals or vegetation are located.
3. The following information to the extent available shall be obtained prior to allowing employees to enter a site:
  - a. Location and approximate size of the site.
  - b. Description of the response activity and/or the task to be performed.
  - c. Duration of the planned employee activity.
  - d. Site topography and geography and previous usage.
  - e. Site accessibility by air and roads.
  - f. Pathways for hazardous substance dispersion.

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- g. Present status and capabilities of emergency response teams that would provide assistance to on-site employees at the time of an emergency.
  - h. Hazardous substances and health hazards involved or expected at the site and their chemical and physical properties.
4. PPE shall be provided and used during initial site entry in accordance with the following requirements:
- a. Based upon the results of the preliminary site evaluation, an ensemble of PPE shall be selected and used during initial site entry which will provide protection to a level of exposure below established PELs for known or suspected hazardous substances and health hazards. PPE will be provided for protection from other known and suspected hazards identified during the preliminary site evaluation.
  - b. An escape self-contained breathing apparatus (SCBA) of at least five minutes duration shall be carried by employees or kept available at their immediate work station if positive-pressure SCBA is not used as part of the entry ensemble.
  - c. If the preliminary site evaluation does not produce sufficient information to identify the hazards or suspected hazards of the site, an ensemble of Level B PPE shall be provided as minimum protection and direct reading instruments shall be carried for identifying IDLH conditions.
  - d. Once the hazards of the site have been positively identified, the appropriate PPE shall be selected and used.



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5. The following monitoring shall be conducted during site entry when the site evaluation produces information which shows the potential for ionizing radiation or IDLH conditions, or when the site information is not sufficient to rule out these possible conditions:
  - a. Monitoring for hazardous levels of ionizing radiation.
  - b. Monitoring the air with appropriate test equipment for IDLH and other conditions that may cause death or serious harm (combustible or explosive atmospheres, oxygen deficiency, toxic substance.)
  - c. Visually observe signs of actual or potential IDLH or other dangerous conditions.
6. Once the presence and concentrations of specific hazards have been established, the risks associated with these substances shall be identified. Employees who will be working on the site shall be informed of any risks that have been identified. Employees who will be working on the site shall be informed of any risks that have been identified.

Note:

Risks to consider include, but are not limited to:

- o Exposures exceeding the appropriate Threshold Limit Value (TLVs), Permissible Exposure Limits (PELs), or Recommended Exposure Limits (RELs).
- o IDLH concentrations.
- o Potential skin absorption and irritation sources.
- o Potential eye irritation sources.
- o Explosion sensitivity and flammability ranges.

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7. Any information concerning the chemical, physical, and toxicological properties of each substance known or expected to be present on site shall be made available to all employees prior to the commencement of their work activities.

8. After site characterization has determined the site is safe for the start-up of operations, an ongoing air monitoring program shall be implemented.

B. Site Control 1910.120 (d)

A site control program for preventing contamination of employees shall be developed during the planning stages of hazardous waste operations cleanup, and shall, as a minimum, include:

1. A site map.
2. Site work zones.
3. The use of the "buddy system."
4. Site communications.
5. The standard operating procedures (SOPs) or safe work practices.
6. Identification of nearest medical assistance.

C. Training 1910.120 (e)

1. Curriculum

- a. Employees (such as, equipment operators and general laborers and supervisors and site managers) exposed to hazardous substances shall be trained in the following:
  1. Names of personnel and alternates responsible for site safety and health.
  2. Safety, health, and other hazards present on the site.

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3. Use of PPE.
  4. Work practices by which the employee, supervisor, and site management can minimize risks from hazards.
  5. Safe use of engineering controls and equipment on the site.
  6. Medical surveillance requirements including recognition of symptoms and signs which might indicate over exposure to hazards.
  7. Site control measures.
  8. Decontamination procedures.
  9. Site's SOPs.
  10. A contingency plan which covers, among other requirements, safe and effective responses to emergencies, including the necessary PPE and other equipment.
  11. Confined space entry procedures.
- b. All employees, including supervisors and site management, shall, prior to job assignment, receive:
1. A minimum of 40 hours of initial instruction off-site.
  2. A minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor.
- c. Workers who may be exposed to special hazards shall be provided with additional training.

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- d. Employees who are responsible for responding to hazardous emergency situations that may expose them to hazardous substances shall be trained in accordance with 29 CFR 1910.120.
- e. Employees, supervisors, and site management shall receive eight hours of annual update training.
- f. The level of training provided shall be consistent with the employee's job function and responsibilities.
- g. On-site management and supervisors directly responsible for or who supervise employees engaged in hazardous waste operations shall receive an additional eight hours of specialized training on managing such operations prior to job assignment.
- h. Trainers shall have received a level of training higher than and including the subject matter of the level of instruction that they are providing.
- i. Employees shall not participate in field activities until they have been trained to a level required by their job function and responsibility.
- j. Employees and supervisors that have received and successfully completed the training and field experience shall be certified by their instructor as having completed the necessary training. Any person who has not been so certified or meets the training requirements is prohibited from engaging in hazardous waste operations.
- k. Employees who can show by an employee's work experience and/or training that the employee has had initial training equivalent to the training required shall be considered as meeting the initial training requirements.

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Effective Date: 11-01-91

Responsible Positions: General Manager, Assistant General  
Manager, Health and Safety Coordinator,  
Project Manager, Operations Manager,  
Site Supervisor, Technician

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Objective: To set forth the minimum requirements by law for  
all employers and employees working or involved  
with Hazardous Waste Operations.

The purpose of this procedure is to summarize and outline 29 CFR  
Subpart H 1910.120 and its requirements for employees working with  
hazardous waste operations. This is an overview of the 29 CFR  
1910.120 regulation and not an actual operating procedure.  
Specific MARCOR standard operating procedures for the components of  
this regulation are referenced within.

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#### OUTLINE

- I. DISCUSSION
- II. DEFINITIONS
- III. PROCEDURES
- IV. REFERENCES

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D. Medical Surveillance 1910.120 (f)

1. Employees Covered

A medical surveillance program shall be instituted by the employer for:

- a. All employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limits for these substances, without regard to the use of respirators, for 30 days or more a year.
- b. All employees who wear a respirator for 30 days or more a year.
- c. Hazmat employees while engaged in hazardous waste operations covered by this section.
- d. The employer shall make medical examinations or consultations available to all employees who may have been exposed in an emergency situation to hazardous substances at concentrations above the permissible exposure limits.

2. Frequency of Medical Examinations and Consultations

Medical examinations and consultations shall also be made available by the employer to each employee on the following schedules:

- a. Prior to assignment.
- b. At least once every twelve months for each employee covered.
- c. At termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last six months.

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- d. As soon as possible, upon notification by an employee either that the employee has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards.
- e. At more frequent times, if the examining physician determines that an increased frequency of examination is medically necessary.

3. Content of Medical Examinations and Consultations

- a. Medical examinations shall include a medical and work history with special emphasis on symptoms related to the handling of hazardous substances and to fitness for duty including the ability to wear any required PPE under conditions (i.e. temperature extremes) that may be expected at the work site.
- b. The content of medical examinations or consultations made available to employees shall be determined by the examining physician.

4. Examination by a Physician and Costs

All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

5. Information Provided to the Physician

- a. A copy of this standard and its appendices.
- b. A description of the employee's duties as they relate to the employee's exposures.
- c. The employee's exposure levels or anticipated exposure levels.

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- d. A description of any personal protective equipment used or to be used.
- e. Information from previous medical examinations of the employee which is not readily available to examining physician.

6. Physician's Written Opinion

- a. The employer shall obtain and furnish the employee with a copy of a written opinion from the examining physician containing the following:
  - The results of the medical examination and tests.
  - The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health.
  - The physician's recommended limitations upon the employees assigned work.
  - A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.
- b. The written opinion obtained by the employer shall not reveal specific findings or diagnoses unrelated to occupational exposure.

7. Recordkeeping

- a. An accurate record of the medial surveillance required shall be retained. This record shall be retained for the period specified and meet the criteria of 29 CFR 1910.120.



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- b. The record required shall include at least the following information:
  - The name and social security number of the employee.
  - Physicians' written opinion.
  - Any employee medical complaints related to exposure to hazardous substances.
  - A copy of the information which shall be provided to the examining physician by the employer, with the exception of the standard and its appendices.
- c. The employer shall ensure that this record is retained for the period specified in 29 CFR 1910.20.

E. Engineering Controls, Work Practices, and Personal Protective Equipment 1910.120 (g)

1. Engineering Controls, Work Practices and PPE

Engineering controls and work practices shall be instituted to reduce and maintain employee exposure not to exceed the (PELs) found in 29 CFR Part 1910, Subpart Z, except to the extent that such controls and practices are not feasible.

Note:

Suggested engineering controls shall include the use of pressurized cabs or control booths on equipment, and/or the use of remotely operated material handling equipment.

Suggested work practices shall include the removal of all non-essential employees from potential exposure during the opening of drums, or the wetting down of dusty areas, and the relocation of employees who are upwind of possible hazards.

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2. Feasibility

When these engineering controls and work practices are not feasible, PPE shall be used to reduce and maintain exposures not to exceed the PELs.

3. Rotation

Rotation, as a means of compliance with PELs, is not permitted.

4. Combined Controls

An appropriate combination of engineering controls, work practices, and PPE shall be established to reduce and maintain employee exposure to or below the established PEL for hazardous substances not regulated by 29 CFR Part 1910 subpart Z and health hazards. For PELs for hazardous substances not regulated by Federal or State OSHA programs.

5. PPE Selection

- a. PPE shall be selected by a health & safety professional.
- b. PPE selection shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.
- c. Positive pressure SCBA, or positive pressure air-line respirators equipped with an escape air supply shall be used in IDLH conditions.
- d. Totally-encapsulating chemical protective suits (Level A protection) shall be used in conditions where contact of the skin by the hazardous substance may result in an IDLH situation.

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- e. The level of protection provided by selected PPE shall be increased when additional information or site conditions show that increased protection is necessary to reduce employee exposure. (See Appendix B for guidance on selecting PPE ensembles.)

The level of protection provided may be decreased when additional information or site conditions warrant decreased protection.

- f. PPE shall be selected and used to meet the requirements of 29 CFR Part 1910, Subpart I, and additional requirements specified in this section.

6. Totally-encapsulating Chemical Protective Suits

- a. Totally-encapsulating suit materials used for Level A protection shall protect employees from the particular hazards which are identified during site characterization and analysis.
- b. Totally-encapsulating suits shall be capable of maintaining positive air pressure.
- c. Totally-encapsulating suits shall be capable of preventing inward test gas leakage of more than 0.5 percent.

7. PPE Program

A PPE program shall be established for hazardous waste operations. The PPE program shall address the following elements:

- a. Site hazards.
- b. PPE selection.
- c. PPE use.
- d. Duration of project.

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- c. A different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling).
  - d. Employees are handling leaking drums or containers or working in areas with liquid contamination (e.g., a spill or lagoon).
4. After hazardous waste cleanup operations commence, those employees likely to have the highest potential exposures to those hazardous substances and health hazards shall be monitored. Samples shall be taken frequently to characterize employee exposures.

G. Informational Programs 1910.120 (i)

1. Site Safety and Health Plan

The OSHA required Site Safety and Health Plan, which shall be available on the site for inspection by employees, their designated representatives, and OSHA personnel, shall address the safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection.

- a. The Site Safety and Health Plan shall at least address the following:
  - 1. Names of key personnel and alternates responsible for site safety and health and appointment of a Site Safety and Health Officer.
  - 2. A safety and health risk analysis for each site task and operation.
  - 3. Employee training assignments.
  - 4. PPE to be used by employees for each of the site tasks and operations being conducted.
  - 5. Medical surveillance requirements.

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- e. PPE maintenance and storage.
- f. PPE decontamination.
- g. PPE training and proper fitting.
- h. PPE donning and doffing procedures.
- i. PPE inspection.
- j. PPE in-use monitoring.
- k. Evaluation of the effectiveness of the PPE program.
- l. Limitations during temperature extremes.

F. Monitoring 1910.120 (h)

- 1. Industrial hygiene monitoring (personnel and area) shall be conducted by qualified industrial hygienists or designated technicians under the supervision of industrial hygienists. They will identify and quantify airborne levels of hazardous substances to determine the effectiveness of engineering controls and work practices and the appropriate level of employee protection needed on-site. They will also document exposure.
- 2. Air monitoring shall be conducted to identify any IDLH or other dangerous situations, such as the presence of flammable atmospheres, oxygen-deficient environments, toxic levels of airborne contaminants, or the presence of radioactive materials.
- 3. Periodic monitoring shall be conducted when:
  - a. Work begins on a different portion of the site.
  - b. Contaminants other than those previously identified are being handled.

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H. Handling Drums and Containers 1910.120 (j)

1. General

- a. Drums and containers used during the clean-up shall meet the appropriate U.S. DOT, Occupational Safety and Health Administration (OSHA), and Environmental Protection Agency (EPA) regulations for the wastes that they contain.
- b. Drums and containers shall be inspected and their integrity shall be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of inaccessible location shall be inspected prior to further handling.
- c. Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
- d. Site operations shall be organized to minimize the amount of drum or container movement.
- e. Prior to movement of drums or containers, all employees exposed to the transfer operation shall be warned of the potential hazards associated with the contents of the drums or containers.
- f. U.S. DOT specified salvage drums or containers and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur.
- g. Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred.
- h. Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container, using a device classified for the material being transferred.

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6. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used. Methods of maintenance and calibration of monitoring and sampling equipment to be used.
  7. Site control measures.
  8. Decontamination procedures.
  9. SOPs.
  10. A contingency plan meeting the "Emergency Response" (paragraph J.) requirements for safe and effective responses to emergencies including the necessary PPE and other equipment.
  11. Confined space entry procedures.
    - b. Pre-entry briefings shall be held prior to initiating any site activity and at such other times as necessary to ensure that employees are apprised of the site Safety and Health Plan and that it is being followed.
    - c. Inspection shall be conducted by the site's Safety Health Officer or, in the absence of that individual, another individual acting on his/her behalf as necessary to determine the effectiveness of the site's Safety and Health Plan.
    - d. Any deficiencies in the effectiveness of the site's Safety and Health Plan shall be corrected.
2. Employee Health & Safety Work Rules Manuals
- Employee General and Hazardous Waste Site Remediation Activities Work Rule Manuals shall be provided to employees before commencement of work.

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- i. A ground-penetrating system or other type of detection system or device shall be used to estimate the location and depth of drums or containers.
- j. Soil or covering material shall be removed with caution to prevent drum or container rupture.
- k. Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L shall be on hand and ready for use to control small fires.
- l. When there is a reasonable possibility of flammable atmosphere being present, material handling equipment and hand tools shall be of the type to prevent sources of ignition.

2. Opening Drums and Containers

MARCOR developed the following procedures for areas where drums or containers are being opened:

- a. Where an airline respirator system is used, connections to the bank of air cylinders shall be protected from contamination. The entire system shall be protected from physical damage.
- b. Employees not involved in opening drums or containers shall be kept a safe distance from the drums or containers being opened.
- c. If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the employee and the containers.
- d. Controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier.



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e. Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, appropriate shielding shall be placed between the employee and the containers to reduce the risk of employee injury.

f. Employees shall not stand upon containers.

3. Electrical Material Handling Equipment

Electrical material handling equipment used to transfer drums and containers shall:

a. Be positioned and operated to minimize sources of ignition related to the equipment from igniting for the materials being handled.

b. Meet the requirements of 29 CFR 1910.307 and be of the appropriate electrical classification for the materials being handled.

4. Radioactive Wastes

Drums and containers containing radioactive wastes shall not be handled until such time as their hazard to employees is properly assessed.

5. Shock-Sensitive Wastes

Caution: Shipping of shock-sensitive wastes may be prohibited under U.S. DOT regulations. Employers and their shippers should refer to 49 CFR 173.21 and 173.50.

At a minimum, the following precautions shall be taken when drums and containers containing or suspected of containing shock-sensitive wastes are handled:

a. All non-essential employees shall be evacuated from the area of transfer.

b. Material handling equipment shall be provided with explosive containment devices or protective shields to protect equipment operators from exploding containers.

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- c. An employee alarm system capable of being perceived above surrounding light and noise conditions shall be used to signal the commencement and completion of explosive waste handling activities.
- d. Continuous communications (i.e., portable radios, hand signals, telephones, as appropriate) shall be maintained between the Project Manager or Site Manager of the immediate handling area and the site's Safety and Health Officer until the handling operation is completed. Communication equipment or methods that could cause shock-sensitive materials to explode shall not be used.
- e. Drums and containers under pressure, as evidenced by bulging or swelling, shall not be moved until the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the drum.
- f. Drums and containers containing packaged laboratory wastes shall be considered to contain shock-sensitive or explosive materials until they have been characterized.

6. Laboratory Waste Packs

In addition to the requirements of H 5 of this section, the following precautions shall be taken, at a minimum, in handling laboratory waste packs (lab packs):

- a. Lab packs shall be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes.
- b. If crystalline material is noted on any container, the contents shall be handled as a shock-sensitive waste until the contents are identified.

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7. Sampling Drums and Containers

Sampling of containers and drums shall be done in accordance with a sampling procedure which is part of the site's Safety and Health Plan developed for and available to employees and others at the specific worksite.

8. Shipping and Transport

- a. Drums and containers shall be identified and classified prior to packaging for shipment.
- b. Drum or container staging areas shall be kept to the minimum number necessary to safely identify and classify materials and prepare them for transport.
- c. Staging areas shall be provided with adequate access and egress routes.
- d. Bulking of hazardous wastes shall be permitted only after a thorough characterization of the materials has been completed.

9. Tank and Vault Procedures

- a. Tanks and vaults containing hazardous substances shall be handled in a manner similar to that for drums and containers, taking into consideration the size of the tank or vault.
- b. Appropriate tank or vault confined space entry procedures shall be followed whenever employees must enter a tank or vault.

I. Decontamination 1910.120 (k)

1. A decontamination procedure shall be developed by health and safety professionals in coordination with site management, communicated to employees, and implemented before any employees or equipment may enter areas on site where potential for exposure to hazardous substances exists.

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2. SOPs shall be developed to minimize employee contact with hazardous substances or with equipment that has contacted hazardous substances.
3. Decontamination shall be performed in areas that will minimize the exposure of uncontaminated employees or equipment.
4. All employees leaving a contaminated area shall be appropriately decontaminated; all clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated.
5. Decontamination procedures shall be monitored by the site's Safety and Health Officer to determine their effectiveness. When such procedures are found to be ineffective, appropriate steps shall be taken to correct any deficiencies.
6. All equipment and solvents used for decontamination shall be decontaminated or disposed of properly.
7. Protective clothing and equipment shall be decontaminated, cleaned, laundered, maintained, or replaced as needed to maintain their effectiveness.
8. Impermeable protective clothing which contacts or is likely to have contacted hazardous substances shall be decontaminated before removal by the employee.
9. Employees whose non-impermeable clothing becomes wetted with hazardous substances shall immediately remove that clothing and proceed to shower. The clothing shall be disposed of or decontaminated before it is removed from the work zone.
10. Unauthorized employees shall not remove protective clothing or equipment from change rooms.
11. Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment shall be informed of the potentially harmful effects of exposures to hazardous substances.

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12. Where the decontamination procedure indicates a need for showers and change rooms, they shall be provided and meet the requirements of 29 CFR 1910.141.

J. Emergency Response 1910.120 (1)

1. General

- a. An emergency response plan shall be developed and implemented to handle anticipated emergencies prior to the commencement of hazardous waste operations.
- b. An emergency response plan for on-site and off-site emergencies shall address, as a minimum, the following shall be developed:
  - 1. Pre-emergency planning.
  - 2. Personnel roles, lines of authority, training, and communication.
  - 3. Emergency recognition and prevention.
  - 4. Safe distances and places of refuge.
  - 5. Site security and control.
  - 6. Evacuation routes and procedures.
  - 7. Decontamination.
  - 8. Emergency medical treatment and first aid.
  - 9. Emergency alerting and response procedures.
  - 10. Critique of response and follow-up.
  - 11. PPE and emergency equipment.

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2. On-site Emergency Response

a. Training

Training for site emergency response shall be conducted in accordance with Section 1910.120 (e) of this regulation.

b. Procedures for handling on-site emergency incidents.

1. In addition to the elements for the emergency response plan listed above the following elements shall be included for on-site emergency response plans:

- a. Site topography, layout, and prevailing weather conditions.

- b. Procedures for reporting incidents to responsible local, state, and federal governmental agencies.

2. The on-site emergency response plan shall be separate section of the Site Safety and Health Plan.

3. The on-site emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.

4. The on-site emergency response plan shall be rehearsed regularly as part of the overall training program for on-site operations.

5. The on-site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing on-site conditions or information.

6. An employee alarm system shall be installed in accordance with 29 CFR 1910.165 to notify employees of an on-site emergency situation, to stop work activities if necessary, to lower

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background noise in order to speed communications and to begin emergency procedures.

7. Based upon the information available at time of the emergency, MARCOR shall evaluate the incident and the on-site response capabilities and proceed with the appropriate steps to implement the on-site emergency response plan.

### 3. Off-Site Emergency Response

#### a. Training

1. This Title (29 CFR 1910.120) require that training for handling off-site emergency responses involving hazardous substances shall be conducted on a monthly basis and shall be at least 24 hours annually.

The training must include, as a minimum, recognition of hazards, selection, care, and use of PPE and safe operating procedures to be used at the incident scene.

<sup>1</sup> MARCOR obtained from OSHA an interpretation allowing "up front" training (such as ER or Emergency Response Cleanup (ERC) to be credited in place of "monthly training".

#### b. Procedures for Handling Off-Site Emergency Incidents

1. The senior officer responding to an incident involving a hazardous substance or waste shall establish an Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS.
2. The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present.

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3. Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations, and assure that the PPE worn is appropriate for the hazards to be encountered. However, PPE shall meet, at a minimum, the criteria contained in 29 CFR 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage.
4. SCBA shall be worn at all times by persons having possible exposure to hazardous substances or health hazards during initial emergency response operations. After October 1988, only positive-pressure self-contained respirators shall be used.
5. The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site to those who are actively performing emergency operations. However, operations in hazardous areas shall be performed using the buddy system.
6. Back-up personnel shall be standing by with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, shall also be standing by with medical equipment and transportation capability.
7. The individual in charge of the ICS shall designate a safety officer, who is knowledgeable in fire fighting or rescue operations and hazardous substance handling procedures, with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.
8. When activities are judged by the safety officer to be unsafe and/or to involve an imminently dangerous condition, the safety officer shall have the authority to alter,



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suspend, or terminate those activities. The safety officer shall immediately inform the individual in charge of the ICS of any actions taken to correct these hazards at an emergency scene.

9. After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.

4. Hazardous Materials Teams (HAZMAT)

- a. Employees designated by the employer to plug, patch or otherwise temporarily control or stop leaks from containers which hold hazardous substances or health hazards shall be given training in accordance with 1910.120(1)(3). "Off-Site Emergency Response", already outlined, that includes the care and use of chemical protective clothing and procedures to be followed when working on leaking drums, containers, tanks, or bulk transport vehicles.
- b. Members of HAZMAT teams shall receive an annual physical examination by a licensed physician and be provided medical surveillance.
- c. Personal protective clothing and equipment to be used by HAZMAT team members shall meet the requirements of 1910.120(g) "Engineering Controls, Work Practices, and Personal Protective Equipment".
- d. Approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatus shall meet U.S. Department of Transportation (DOT) and National Institute for Occupational Safety and Health (NIOSH) criteria.

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5. Post-Emergency Response Operations

Upon completion of the emergency response, if it is determined that it is necessary to remove hazardous substances, health hazards and materials contaminated with them such as contaminated soil or other elements of the natural environment, then such operations shall meet all the requirements of 1910.120 (b) through (n).

K. Illumination 1910.120 (m)

Work areas shall be lighted to not less than the minimum illumination intensities listed in the table below while any work is in progress:

Minimum Illumination Intensities in Foot-Candles

<u>Foot-Candles</u>	<u>Area or Operations</u>
5.....	General site areas.
3.....	Excavation and waste areas, accessways, active storage areas, loading platforms, refueling, and field maintenance areas
5.....	Indoors: warehouses, corridors, hallways, and exitways.
5.....	Tunnels, shafts, and general underground work areas: (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Bureau of Mines approved cap lights shall be acceptable for use in the tunnel headings.
10.....	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and workrooms.

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30..... First aid stations,  
infirmaries, and offices.

L. Sanitation at Temporary Workplaces 1910.120 (n)

1. Potable Water

- a. An adequate supply of potable water shall be provided on the site.
- b. Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Water shall not be dipped from containers.
- c. Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose.
- d. Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

2. Nonpotable Water

- a. Outlets for nonpotable water, such as water for industrial or firefighting purposes shall be identified to indicate clearly that the water is unsafe and is not to be used for drinking, washing, or cooking purposes.
- b. There shall be no cross-connection, open or potential, between a system furnishing potable water and a system furnishing nonpotable water.

3. Toilet Facilities

- a. Toilets shall be provided for employees according to the table below.

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### Toilet Facilities

<u>Number of Employees</u>	<u>Minimum Number of Facilities</u>
20 or fewer	One
More than 20, fewer than 200.	one toilet seat and one urinal per 40 employees.
More than 200	One toilet seat and one urinal per 50 employees.

- b. Under temporary field conditions, provisions shall be made to assure not less than one toilet facility is available.
- c. Hazardous waste sites, not provided with a sanitary sewer, shall be provided with the following toilet facilities unless prohibited by local codes:
  - 1. Privies.
  - 2. Chemical toilets.
  - 3. Recirculating toilets.
  - 4. Combustion toilets.
- d. The requirements of this paragraph for sanitation facilities shall not apply to mobile crews having transportation readily available to nearby toilet facilities.

#### 4. Food Handling

All employees' food service facilities and operations shall meet the applicable laws, ordinances, and regulations of the jurisdictions in which they are located.

#### 5. Temporary Sleeping Quarters

When temporary sleeping quarters are provided, they shall be heated, ventilated and lighted.

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6. Washing Facilities

The employer shall provide adequate washing facilities for employees engaged in operations where hazardous substances may be harmful to employees. Such facilities shall be near proximity to the worksite, in areas where exposures are below established permissible exposure limits and which are under the control of the employer, and shall be so equipped as to enable employees to remove hazardous substances from themselves.

M. Selected RCRA Operations 1910.120 (p)

When conducting hazardous waste storage, disposal, and treatment operations at facilities specified in 40 CFR Parts 264 and 265 (RCRA), the following shall be developed and implemented:

1. A hazard communication program meeting the requirements of 29 CFR 1910.1200.
2. A medical surveillance program meeting the requirements of 1910.120 (f).
3. A safety and health program for employees involved in hazardous waste operations. The program shall be designed to identify, evaluate, and control safety and health hazards and provide for emergency response in their facilities for the purpose of employee protection.
4. A decontamination procedure in accordance with 1910.120 (k).
5. A training program for employees involved with hazardous waste operations to enable each employee to perform their assigned duties and functions in a safe and healthful manner so as not to endanger themselves or other employees. The initial training shall be for 24 hours and refresher training shall be for eight hours annually.

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N. Emergency Response to Hazardous Releases 1910.120 (q)

1. Emergency Response Plan

An emergency response plan shall be developed and implemented to handle anticipated emergencies prior to the commencement of emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives and OSHA personnel. Employers who will evacuate their employees from the danger area when an emergency occurs and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan in accordance with 1910.38(a).

2. Elements of an Emergency Response Plan

The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following to the extent that they are not addressed elsewhere:

- Pre-emergency planning and coordination with outside parties.
- Personnel roles, lines of authority, training and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Site security and control.
- Evacuation routes and procedures
- Decontamination.
- Emergency medical treatment and first aid.
- Emergency alerting and response procedures.
- Critique of response and follow-up.

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- PPE and emergency equipment.
- Emergency response organizations may use the local emergency response plan or the state emergency response plan or both as part of their emergency response plan to avoid duplication. Those items of the emergency response plan that are being properly addressed by the SARA Title III plans may be substituted into their emergency plan or otherwise kept together for the employer and employee's use.

3. Procedures for Handling Emergency Response

The senior emergency response official shall become the individual in charge of a site specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS assisted by the senior official present for each employer.

4. Skilled Support Personnel

Personnel, not necessarily an employer's own employees, who are skilled in the operation of certain equipment, such as mechanized earth moving or digging equipment or crane and hoisting equipment, and who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by an employer's own employees, and who will be or may be exposed to hazards at an emergency response scene, are not required to meet the training required in this paragraph for the employer's regular employees. However, these personnel shall be given an initial briefing at the site prior to their participation in any emergency response. The initial briefing shall include instruction in the wearing of appropriate personal protective equipment, what chemical hazards are involved, and

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what duties are to be performed. All other appropriate safety and health precautions provided to the employer's own employees shall be used to assure the safety and health of these personnel.

5. Specialist Employees

Employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge, shall receive training or demonstrate competency in the area of their specialization annually.

6. Training

Training shall be based on the duties and function to be performed by each responder of an emergency response organization. The skill and knowledge levels required for all new responders, those hired after the effective date of this standard, shall be conveyed to them through training before they are permitted to take part in actual emergency operations on an incident.

7. Trainers

Trainers who teach any of the above training subjects shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses ordered by the U.S. National Fire Academy, or they shall have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach.



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8. Refresher Training

Those employees who are trained shall receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate competency in those areas at least yearly.

9. Medical Surveillance and Consultation

Members of an organized and designated HAZMAT team and hazardous materials specialists shall receive a baseline physical examination and be provided with medical surveillance. Any emergency response employees who exhibit signs or symptoms which may have resulted from exposure to hazardous substances during the course of an emergency incident, either immediately or subsequently, shall be provided with medical consultation.

10. Chemical Protective Clothing

Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists shall meet the requirements of this section.

11. Post Emergency Response Operations

Upon completion of the emergency response, if it is determined that it is necessary to remove hazardous substances, health hazards, and materials contaminated with them (such as contaminated soil or other elements of the natural environment) from the site of the incident, the employer conducting the clean-up shall comply with one of the following:

- Meet all of the requirements of paragraphs (b) through (o) of 1910.120  
or
- Where the clean-up is done on plant property using plant or workplace employees, such employees shall have completed the training

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requirements of the following: 29 CFR 1910.38(1); 1910.134; 1910.1200, and other appropriate safety and health training made necessary by the tasks that they are expected to be performed such as personal protective equipment and decontamination procedures.

#### IV. REFERENCES

- A. Title 29, Code of Federal Regulations, Part 1910.120, "Hazardous Waste Operations and Emergency Response".
- B. Title 29, Code of Federal Regulations, Part 1926, Construction Safety Standards.
- C. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. 9601 et seq) (CERCLA).
- D. Resource Conservation and Recovery Act of 1976 as amended (Pub. L., 94-580, 42 U.S.C. 6901) (RCRA).
- E. Superfund Amendments and Reauthorization Act of 1986 (Pub. L., 99-499) (SARA).
- F. "Health & Safety Requirements for Employees Engaged in Field Activities", EPA Order 1440.2, US EPA 7/12/81.
- G. "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," Joint manual by OSHA/EPA/USCG/NIOSH Public #85-115, 10/85.
- H. Title 49, Code of Federal Regulations, Part 171.8, Definitions.
- I. Title 40, Code of Federal Regulations, Part 261.3, Definitions of Hazardous Wastes.

Procedure Number: 02-341-01

Procedure Name: Cold Stress

Effective Date: 11-01-91

Supersedes Procedure Number: 4.1.15

Responsible Positions: Health and Safety Coordinator, Operations Manager, Assistant Operations Manager, Supervisor

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Objective: To establish guidelines to protect workers from the effects of cold stress (hypothermia) and cold injury.

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### DISCUSSION

Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a fall in deep core temperature of the body.

Employees should be protected from exposure to cold so that the deep core temperature does not fall below 36 centigrade (C) (98.6 degrees Fahrenheit). Lower body temperature will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

### PROCEDURE

- A. Workers shall be required to wear warm clothing, such as mittens, heavy socks, etc., when the air temperature is below 40-45 Fahrenheit (F). Protective clothing may be used to protect the employee.
- B. When the air temperature is below 40 F (depending upon employee comfort), clothing for warmth, in addition to chemical protective clothing, shall be required. This will include:
  - 1. Insulated suits, such as whole-body thermal underwear,
  - 2. Wool socks or polypropylene socks to keep moisture off the feet if there is a potential of work activity which would cause sweating.

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Procedure Name: Cold Stress

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3. Insulated gloves (when air temperatures are extremely low [less than 5-10 F], gloves with reflective surfaces, which reflect body heat back to the hand, should be used).
  4. Boots.
  5. Insulated head cover, such as knit caps (ski caps).
- C. At air temperature below 35 F, the following work practices must be followed:
1. If the clothing of an employee might become wet on a job site, the other layer of the clothing must be impermeable to water.
  2. If an employee's underclothing (socks, mittens, etc.) becomes wet in any way, the employee must change into dry clothing immediately. If the clothing becomes wet from sweating, the employee may finish the task which caused the sweating before changing into dry clothing.
  3. Employees must be provided a warm area (65 F or above) to change from work clothing into street clothing.
  4. Employees must be provided a warm break area (60 F or above).
  5. If appropriate, space heaters may be provided in the work area to warm the hands, feet, etc.
  6. Hot liquids, such as soups, warm, sweet drinks, etc. shall be provided in the break area. The intake of coffee shall be limited because of the attendant diuretic and circulatory effects.
  7. The buddy system shall be practiced at all times. Any employee observed with severe shivering shall leave the cold area immediately.
  8. Employees should layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing.

Procedure Number: 02-341-01  
Procedure Name: Cold Stress

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9. Avoid overdressing when going into warm areas or when performing activities which are strenuous. This could lead to heat stress problems.
  10. Auxiliary heated versions of handwear, footwear, etc., can be used in lieu of mittens, insulated socks, etc. if extremely cold conditions exist.
  11. Employees handling evaporator liquids (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury to evaporate cooling.
  12. Work shall be arranged in such a way that sitting or standing for long periods of time is minimized.
- D. All employees who may work in cold areas shall be trained in:
1. Proper first aid treatment.
  2. Proper clothing practices.
  3. Proper eating and drinking habits.
  4. Recognition of impending adverse health effects.
  5. Safe work practices.
- E. Clothing for warmth, which is under chemical protective clothing, can be laundered in normal fashion, without the wash water being collected as contaminated water. If there is a rip or tear in the chemical protective clothing in a contaminated area, the clothing-for-warmth must be handled as potentially contaminated, and the water in which it is washed must be collected as potentially contaminated water. More rigorous steps may be required if materials handled are extremely toxic (dioxin, etc.).

#### ASSIGNMENT OF RESPONSIBILITIES

##### A. Health and Safety Coordinator

The Health and Safety Coordinator will be responsible for initial on-site coordination of the cold stress policy. He/she will be assured that all personnel potentially exposed to cold have had proper training, that suitable warm clothing is worn, and that an on-site supervisor can implement the program in his/her absence.

Procedure Number: 02-341-01  
Procedure Name: Cold Stress

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B. Project Manager

The Project Manager will be responsible for field implementation of the cold stress policy. This includes assurance that all personnel on-site comply with the policy. He/she shall also be responsible for taking temperatures, checking for proper clothing, and establishing work practices in the absence of the MARCOR Health and Safety Coordinator.

C. Supervisor

The Supervisor will be responsible for ensuring that work crews comply with all site requirements.

D. Crew Member

All Crew Members will be responsible for understanding and complying with all site requirements.

REFERENCE

Threshold Limit Values and Biological Exposure Indices for 1985-1986, American Conference of Governmental Industrial Hygienists.

Procedure Number: 02-340-01

Procedure Name: Heat Stress

Effective Date: 11/01/91

Supersedes Procedure Number: 4.1.14

Responsible Positions: Health and Safety Coordinator, Supervisor,  
Project Manager, Operations Manager,  
Assistant Operations Manager

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Objective: To establish guidelines to protect all employees from the effects of heat stress (hyperthermia) when working in a hot environment.

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## DISCUSSION

Adverse climatic conditions are important consideration in planning and conducting site operations. High ambient temperature can result in health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal injury, increased accident probability, etc. to serious illness or death. Heat stress is of particular concern when chemical protective garments are worn, since these garments prevent evaporative body cooling. Wearing personal protective equipment puts a worker at considerable risk of developing heat stress.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at sites, regular monitoring and other preventive precautions are vital.

Note: Chemical protective clothing is defined as, but not limited to:

- Polyethylene coated Tyvek
- Saranex coated Tyvek
- Medium weight polyvinylchloride (PVC)
- Sigel suits (heavyweight PVC)
- Fully encapsulating suits

## PROCEDURES

### A. Recommended Guidelines

1. Note that the following guidelines discussed in this section are only intended to be used as a means for initial establishment of a work-rest regimen. It will be the responsibility of a Health and Safety Coordinator to

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Procedure Name: Heat Stress

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evaluate the conditions at a specific operation and make final determinations of the work-rest regimen. Physiological monitoring, as discussed in the following section, will be used to establish more stringent regimens.

2. Unacclimatized Workers - The total heat exposure to unacclimatized workers not wearing protective clothing shall not exceed the guidelines given in Attachment 1. Note that it generally takes an employee seven to ten days to become acclimated to the heat.
3. Acclimatized Workers - The total heat exposure to acclimatized healthy workers not wearing protective clothing shall not exceed the guidelines given in Attachment 2.
4. The guidelines shown in Attachment 1 and 2 are for the worker not wearing chemical protective clothing. If the worker is wearing chemical protective clothing, the guidelines in Attachment 1 and 2 should be changed by 10° F. In other words, add 10° F to the WBGT reading and use this adjusted WBGT in Attachment 1 and 2.
5. The metabolic heat rate to use in Attachment 1 and 2 shall be estimated using Attachment 3.

B. Physiological Monitoring

1. For operations at which workers are wearing impermeable chemical protective clothing, physiological monitoring is necessary when the ambient temperature exceeds 78° F (25.5° C).
2. After the initial work-rest regimen is established, as discussed in Section A, it is necessary to perform physiological monitoring to determine if the established work-rest regimen should be adjusted. The following guidelines will be used to adjust the regimen and should be recorded on the Employee Physiological Monitoring Record Form #02340F1.



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a. Baseline Information

Determine a baseline heart rate for each employee prior to on-site activities by counting the radial pulse.

b. Increasing Work Rate

1. If a worker's heart rate and oral temperature do not increase, or only increase slightly (10% or less for the heart rate and 0.5% or less for the oral temperature) from the baseline readings after the first work cycle, the work period (according to the established work-rest regimen) can be increased by 20%.
2. The worker shall be monitored closely after the next work cycle period and if there are still no significant increases in heart rate and oral temperature, the work period can be increased by an additional 10% and the rest period remains the same.
3. Increases in the work period can be made throughout the shift if there are no significant increases in the physiological monitoring indices.
4. Note that the increases to the work period are made based on the work-rest regimen established from WBGT (Wet Bulb Globe Thermometer) readings. These WBGT readings will change throughout the day as the temperature rises or falls.

c. Decreasing Work Rate

1. Pulse

- a. Count the radial pulse as early as possible in the rest period.

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- b. If a worker's heart rate exceeds 110 beats per minute after a work period, shorten the next work cycle by 30% and keep the rest period the same.
- c. If the heart rate still exceeds the 110 beats per minute after the next work period, shorten the following work cycle by 30%.
- d. Continue to shorten the employee's work cycle until the heart beat is below 110 beats per minute.

2. Temperature

- a. Use a clinical thermometer or similar device to measure the oral temperature at the end of a work period (before drinking).
- b. If the oral temperature exceeds 99.6° F (37.6° C), shorten the next work cycle by 30% without changing the rest period.
- c. If the oral temperature exceeds 99.6° F at the beginning of the next rest period, shorten the following work cycle by 30%.
- d. Do not permit a worker to return to the work area when the oral temperature exceeds 100.6° F (38.1° C).

C. Prevention

- 1. Establish a work-rest regimen according to the guidelines given in Section A and B of this policy.
- 2. Adequate liquids must be provided to replace lost body fluids. Employees must replace water and salt lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement. A minimum of 2 cups/30 minutes is required.

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Replacement fluids can be a 0.1% salt water solution, a commercial mix, such as Gatorade or Quik Kick, or a combination of these with fresh water. Employees should be encouraged to salt their foods more heavily.

The replacement fluid temperature should be kept cool.

3. Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.
4. All breaks are to be taken in a cool, shaded rest area (77° F is best).
5. Employees shall remove chemical protective garments during rest periods.
6. Employees shall not be assigned other tasks during rest periods.
7. All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
8. Employees shall be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.

D. Training

Those personnel (including contractor employees) potentially exposed to heat stress conditions shall have the following training:

1. Employees
  - a. Sources of heat stress, influence of protective clothing, and importance of acclimatization.
  - b. How the body handles heat.
  - c. Heat related illnesses.

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- d. Preventative/Corrective measures.
- e. First Aid procedures.
- f. Be provided at hire with "A Working Person's Guide to Prevent Heat Stress" (Attachment 5).

2. MARCOR Supervisors

- a. Measurement methods and calculations of WBGT and physiological monitoring.

ASSIGNMENT OF RESPONSIBILITIES

A. Health and Safety Coordinator

Health and Safety Coordinator will be responsible for initial on-site coordination of the heat stress policy. He/she shall establish work/rest regimens from the Wet Bulb Globe Thermometer (WBGT) readings and conduct physiological monitoring when on site.

B. Project Manager

The Project Manager will be responsible for field implementation of the heat stress policy. This includes assurance that all personnel on-site comply with the policy. He/she shall be responsible for establishing and monitoring safe work practices. He/she will ensure that all personnel potentially exposed to heat have proper training and that on-site supervision implements the program in his/her absence.

C. Supervisor

The Supervisor will be responsible for ensuring that work crews comply with all site requirements, including the heat stress policy. In the absence of the Health and Safety Coordinator, he/she shall also be responsible for physiological monitoring as outlined in Guideline Attachment 3 to this procedure. Team members shall also observe their fellow workers for signs of heat stress.

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D. Team Member

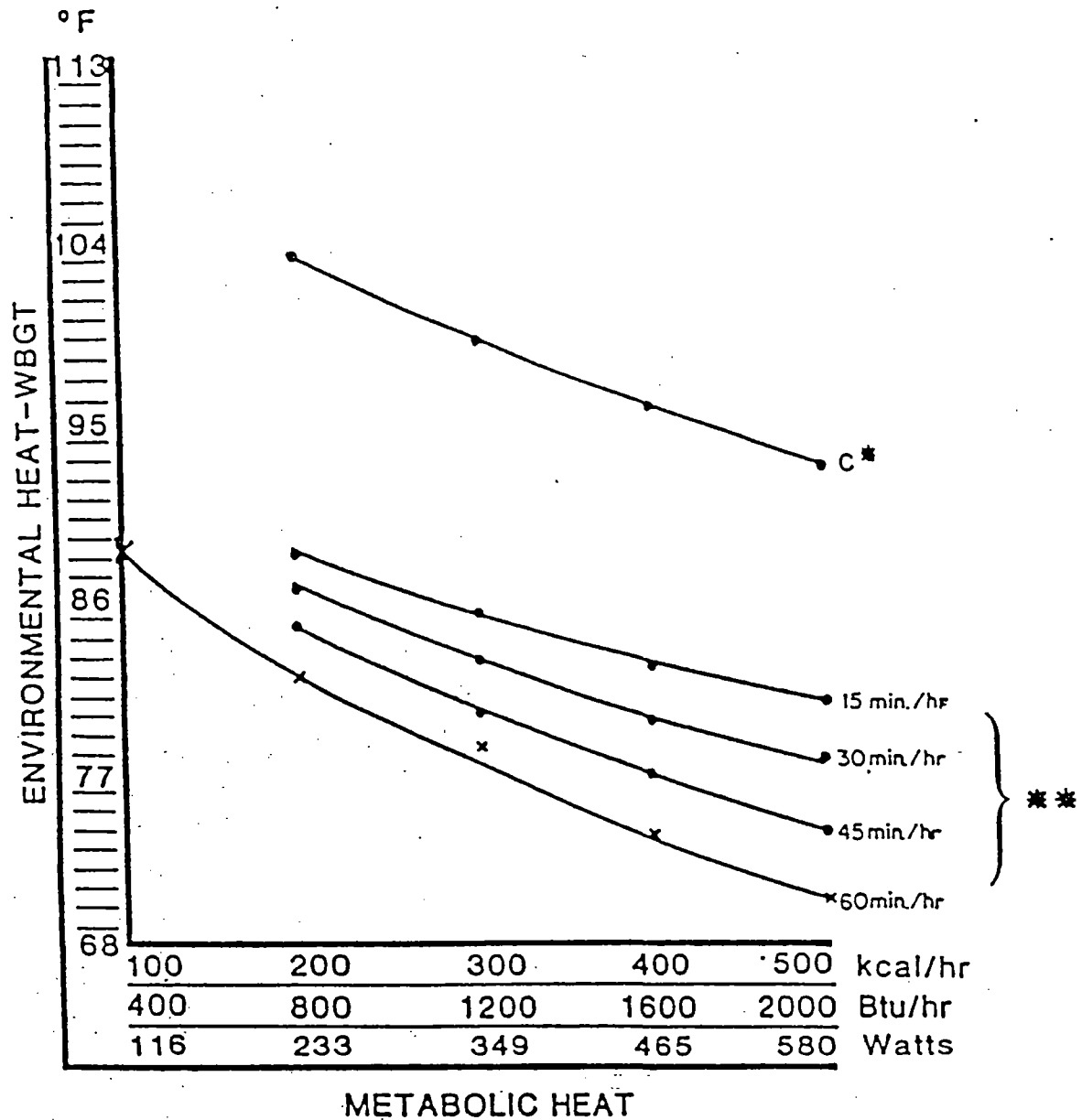
All Team Members will be responsible for understanding and complying with all site requirements, including the heat stress policy.

REFERENCES

- A. Threshold Limit Values and Biological Exposure Indices for 1985-1986, American Conference of Governmental Industrial Hygienists.
- B. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/EPA, Health and Human Services, Public Health Service, Center for Disease Control, NIOSH.
- C. Criteria for a Recommended Standard, Occupational Exposure to Hot Environments, Revised Criteria 1986, U.S. Department of Health and Human Services, Public Service, Center for Disease Control, NIOSH.

ATTACHMENTS

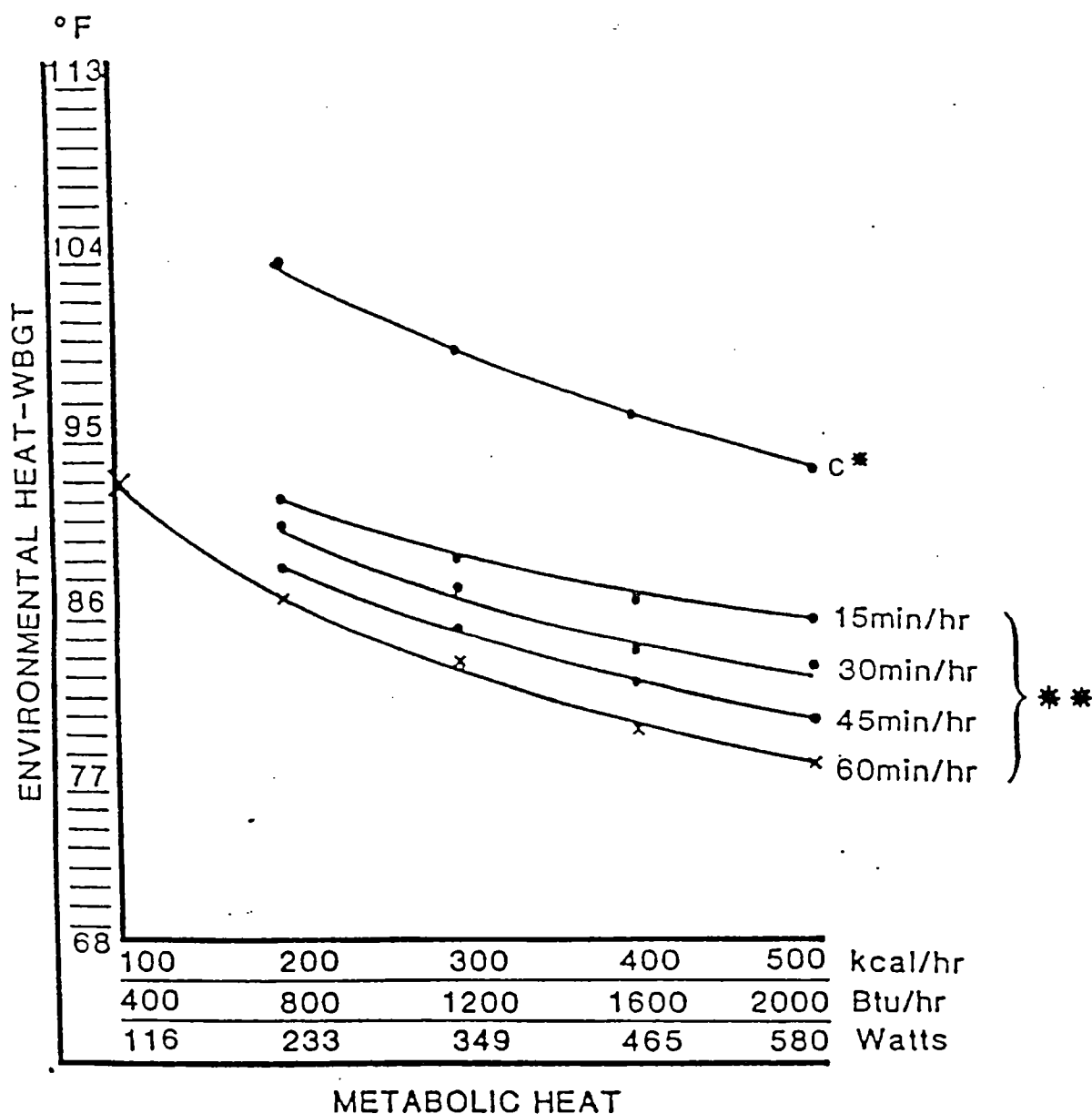
- 1. Recommended Heat Stress Guidelines for Unacclimated Workers in Hot Environments.
- 2. Recommended Heat Stress Guidelines for Acclimated Workers in Hot Environments.
- 3. Assessment of Employee Work Load in Hot Environments.
- 4. Employee Physiological Monitoring Record for Heat Stress.
- 5. A Working Person's Guide to Prevent Heat Stress.



## Recommended Heat Stress Guidelines for Unacclimated Workers in Hot Environments

\* C= Ceiling Limit - No work should be performed without body cooling provided

\*\* Work-Rest Regimen - Minutes worked per hour



## Recommended Heat Stress Guidelines for Acclimated Workers in Hot Environments

\* C= Ceiling Limit - No work should be performed without  
body cooling provided

\*\* Work-Rest Regimen = Minutes worked per hour

# ASSESSMENT OF EMPLOYEE WORK LOAD IN HOT ENVIRONMENTS

## A. BODY POSITION AND MOVEMENT

	<u>kcal/min</u>
Sitting	0.3
Standing	0.6
Walking	2.0-23.0
Walking Uphill	add 0.8 per meter rise

## B. TYPE OF WORK

	<u>Average kcal/min</u>	<u>Range kcal/min</u>
Hand Work		
Light	0.4	0.2-1.2
Heavy	0.9	
Work One Arm		
Light	1.0	0.7-2.5
Heavy	1.8	
Work Both Arms		
Light	1.5	1.0-3.5
Heavy	2.5	
Work Whole Body		
Light	3.5	2.5-9.0
Moderate	5.0	
Heavy	7.0	
Very Heavy	9.0	

## C. BASAL METABOLISM

1.0

## D. SAMPLE CALCULATION

	<u>Average kcal/min</u>
Assembly Work With Heavy Hand Tools	
1. Standing	0.6
2. Two-Arm Work	3.5
3. Basal Metabolism	1.0
TOTAL	5.1 kcal/min x 60 = 306 kcal/hr



A WORKING PERSON'S GUIDE TO PREVENT HEAT STRESS

## WHAT IS HEAT STRESS?

Heat stress is an illness which results from too much exposure to heat. This illness may include heat exhaustion (headaches, nausea or dizziness) or heat cramps (cramping in the muscles). If unrecognized and not treated early, heat stress can lead to heat stroke. Heat stroke can be fatal and occurs on hot jobs.

## WHAT ARE HOT JOBS?

Hot jobs have hot processes, radiant heat exposure, or unprotected sun exposure. These jobs cause constant sweating and require additional fluid intake. Workers on hot jobs must use protective measures.

## WHAT ARE PROTECTIVE MEASURES?

1. Take Frequent Rest Breaks

Hot jobs require frequent rest breaks in cool areas, often on an hourly basis. With heavy work and higher temperatures, rest periods must be longer and more often on hot jobs. On hot days, employers may need to furnish relief workers.

2. Drink Water or Other Fluids At Least Every Hour For Effective Sweating

A quart or more of water is lost each hour by sweating on hot jobs. Your body must replace this water loss by drinking water often. On very hot jobs you should drink fluid twice or more an hour. This is necessary because your stomach cannot hold enough fluid from one drink (over a quart) to adequately supply your body for one hour on a hot job.

3. Avoid Overuse of Salt Tablets

You may need salt tablets for one or two weeks after beginning on a hot job or after returning from a vacation or a sick leave. If you get heat cramps, this indicates a need for salt. Otherwise, avoid salt tablets because the average American diet has plenty of salt for a worker adjusting to a hot job. Excess salt may increase your risk for high blood pressure.

4. Use Appropriate Clothing and Other Protection

Although it is a tradition to wear long underwear while working in hot places, this prevents the body from cooling through sweating. If hot processes give off so much heat that you feel more comfortable in long underwear, reflective clothing or other heat reflective barriers are needed. This equipment will protect you from radiant heat and also allow cooling by sweating.

5. Protect Your Health

Protect your health by coming to work in good physical condition. Avoid alcohol before coming to work. If you have a hangover, your body needs more water than usual and you may be at a greater risk of heat stress. If you have a hot job and are on fluid pills or other medication, check with your doctor. Although these personal measures alone are not sufficient protection, they are helpful.

EMPLOYEE PHYSIOLOGICAL MONITORING RECORD  
FOR HEAT STRESS

Employee Name: \_\_\_\_\_ Date: \_\_\_\_\_ Employee S.S. #: \_\_\_\_\_  
Division: \_\_\_\_\_ Start Time: \_\_\_\_\_ Location: \_\_\_\_\_  
P.C. #: \_\_\_\_\_ Stop Time: \_\_\_\_\_ Job Number: \_\_\_\_\_  
Health & Safety Coordinator: \_\_\_\_\_ Supervisor: \_\_\_\_\_

TEMPERATURES

## A. INITIAL READING

1. Ambient Air Temperature \_\_\_\_\_  
2. Baseline Oral Temperature \_\_\_\_\_  
3. WBGT \_\_\_\_\_

## B. AFTER FIRST WORK PERIOD

1. Ambient Air Temperature \_\_\_\_\_  
2. Oral Temperature \_\_\_\_\_  
3. WBGT \_\_\_\_\_

## C. AFTER SECOND WORK PERIOD

1. Ambient Air Temperature \_\_\_\_\_  
2. Oral Temperature \_\_\_\_\_  
3. WBGT \_\_\_\_\_

## D. AFTER THIRD WORK PERIOD

1. Ambient Air Temperature \_\_\_\_\_  
2. Oral Temperature \_\_\_\_\_  
3. WBGT \_\_\_\_\_

## E. AFTER FOURTH WORK PERIOD

1. Ambient Air Temperature \_\_\_\_\_  
2. Oral Temperature \_\_\_\_\_  
3. WBGT \_\_\_\_\_

## F. AFTER FIFTH WORK PERIOD

1. Ambient Air Temperature \_\_\_\_\_  
2. Oral Temperature \_\_\_\_\_  
3. WBGT \_\_\_\_\_

HEART RATE

## A. INITIAL READING

1. Baseline Heart Rate \_\_\_\_\_ B/min

## B. AFTER FIRST WORK PERIOD

1. Heart Rate \_\_\_\_\_ B/min

## C. AFTER SECOND WORK PERIOD

1. Heart Rate \_\_\_\_\_ B/min

## D. AFTER THIRD WORK PERIOD

1. Heart Rate \_\_\_\_\_ B/min

## E. AFTER FOURTH WORK PERIOD

1. Heart Rate \_\_\_\_\_ B/min

## F. AFTER FIFTH WORK PERIOD

1. Heart Rate \_\_\_\_\_ B/min

Procedure Number: 02-338-02

Procedure Name: Fall Protection

Effective Date: 01/17/2000

Supersedes Procedure Number: 02-338-01

Responsible Positions: General Manager, Operations Manager, Assistant Operations Manager, Project Manager, Warehouse Manager, Operations Administrator, Supervisor

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Objective: To preserve the health and safety of our employees and the general public by setting forth requirements for fall protection. To meet the requirements set forth by OSHA on fall protection in standard 29 CFR 1926.500

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I. DEFINITIONS

II. POLICIES AND PROCEDURES

III. SAMPLE FALL PROTECTION PLAN

## I. DEFINITIONS

**Anchorage** - means a secure point of attachment for lifelines, lanyards or deceleration devices.

**Body harness** - means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to the other components of a personal fall arrest system.

**Buckle** - means any device for holding the body harness closed around the employee's body.

**Connector** - means a device that is used to connect parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or dee-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

**Controlled access zone (CAZ)** - means an area in which certain work (e.g., overhead bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety-net systems and access to the zone is controlled.

**Dangerous equipment** - means equipment (such as pickling or galvanizing tanks, degreasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

**Deceleration device** - means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc. which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

**Equivalent** - means alternative designs, materials, or methods to protect against a hazard that can be demonstrated to provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the OSHA standard on fall protection.

**Failure** - means load refusal, breakage or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

**Free fall** - means the act of falling before a personal arrest system begins to apply force to arrest the fall.

**Free fall distance** - means the vertical displacement of the fall arrest attachment point on the employee's body harness between onset

**Guardrail system** - means a barrier erected to prevent employees from falling to lower levels.

**Hole** - means a gap or void 2 inches or more in its least dimension, in a floor, roof, or other walking/working surface.

**Infeasible** – means that it is impossible to perform the construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

**Lanyard** – means a flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body harness to a deceleration device, lifeline, or anchorage.

**Leading edge** – means the edge of a floor, roof or formwork from a floor or other walking/working surface (such as a deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed or constructed. A leading edge is considered to be an unprotected side and edge during periods when it is not actively and continuously under construction.

**Lifeline** – means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

**Low-slope roof** – means a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

**Lower levels** – means those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures or portions thereof.

**Mechanical equipment** – means all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcars.

**Opening** – means a gap or void 30 inches (76 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.

**Overhand bricklaying and related work** – means the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite site of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhead bricklaying process.

**Personal fall arrest system** – means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

NOTE: As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

**Positioning device system** – means a body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

**Rope grab** – means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking or both.

**Roof** – means the exterior surface on the top of a building. This does not include floors or formwork that, because a building has not been completed, temporarily becomes the top surface of a building.

**Roofing work** – means the hoisting, storage, application and removal of roofing materials and equipment, including related insulation, sheet metal and vapor barrier work, but not including the construction of the roof deck.

**Safety-monitoring system** – means a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

**Self-retracting lifeline/lanyard** – means a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement; and which, after onset of a fall, automatically locks the drum and arrests the fall.

**Snaphook** – means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object.

Snaphooks are generally one of two types:

the locking type with a self-closing, self-locking keeper that remains closed and locked until unlocked and pressed open for connection or disconnection.

The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. NOTE: As of January 1, 1998, the use of non-locking snaphooks as part of a personal fall arrest system and positioning device system is prohibited.

**Steep roof** – means a roof having a slope greater than 4 in 12 (vertical to horizontal).

**Toeboard** – means a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

**Unprotected sides and edges** – means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, ramp, roof or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

**Walking/working surface** – means any surface, whether horizontal or vertical on which an employee walks or works, including but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles or trailers, on which employees must be located in order to perform their job duties.

**Warning line system** – means a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in

which roofing work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

**Work area** – means that portion of a walking/working surface where job duties are being performed.

## II. POLICIES AND PROCEDURES

### *General*

The Operations Manager or his/her designee is responsible for determining if a walking/working surface has the strength and structural integrity to support employees safely. Employees will only be allowed to work on surfaces that have the requisite strength and structural integrity.

Guardrail systems, safety net systems or personal fall arrest systems shall be used to protect employees from falling when working on a walking/working surface (horizontal or vertical surface) with an unprotected side or edge which is 6 feet or more above the lower level.

Each employee who is constructing a leading edge of 6 feet or more above the lower levels will be protected by guardrail, safety net or personal fall arrest systems.

Exception: When it can be demonstrated that it is infeasible or creates greater hazard to use these systems, the Operations Manager's designee must develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502. It is important to note that the standard presumes that at least one of the methods above is feasible and will not create a greater hazard to employees. Therefore, it is the Operations Manager's responsibility to establish that it is appropriate to implement an alternative fall protection plan that complies with 29 CFR 1926.502 for a particular workplace situation. A qualified person specifically for the work site must prepare such fall protection plans.

Employees on a walking/working surface 6 feet or more above the lower level where leading edges are under construction who are not engaged in the leading edge work, must be protected by a guardrail, safety net or personal fall arrest system. If a guardrail system is used and a controlled access zone has been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

Employees working in a hoist area must be protected from falling 6 feet or more to lower levels by guardrail or personal fall arrest systems. If guardrail systems or some portion thereof are removed to facilitate the hoisting operations (such as during landing

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of materials) and an employee must lean through the access opening or out over the edge of the access opening to receive or guide equipment and materials, for instance, the employee will be provided and use a personal fall arrest system.

Personal fall arrest systems, covers, or guardrail systems shall be used to protect employees from falling through holes, including skylights, that are more than 6 feet above lower levels. Each employee on a walking or working surface must be protected from tripping or stepping in or through holes, including skylights, by covers. Covers will be used to protect workers from objects falling through holes, including skylights.

Each employee on the face of formwork or reinforcing steel will be protected from falling 6 feet or more to lower levels by personal fall arrest systems, safety net systems, or positioning device systems.

Employees on ramps, runways or other walkways will be protected from falling 6 feet or more to lower levels by guardrail systems.

Each employee at the edge of an excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier.

Each employee at the edge of a well, pit, shaft or similar excavation of 6 feet or more in depth will be protected from falling by guardrail systems, fences, barricades or covers.

When employees are working less than 6 feet above dangerous equipment, they will be protected from falling in or on equipment by guardrail systems or equipment guards.

When employees are working 6 feet or more above dangerous equipment, they will be protected from fall hazards by guardrail systems, personal fall arrest systems or safety nets.

Employees performing overhand bricklaying and related work 6 feet or more above lower levels, will be protected from falling by guardrail systems, safety net systems, personal fall arrest systems or by working in a controlled access zone.

Employees who must reach more than 10 inches below the level the walking or working surface on which they are working, will be protected from falling by a guardrail system, safety net system or personal fall arrest system.

Each employee engaged in roofing activities on low-slope roofs with unprotected sides and edges of 6 feet or more above lower levels will be protected from falling by



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guardrail, safety net, personal fall arrest systems or a combination of warning line system and guardrail system, warning line system and personal fall arrest system, or warning line system and safety monitoring system. On roofs of 50-feet or less in width, the use of a safety monitoring system alone without the warning line system is permitted.

Employees working on a steep roof with unprotected sides and edges 6 feet or more above lower levels will be protected from falling by guardrail systems with toeboards, safety net systems or personal fall arrest systems.

Employees who engage in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams, and floor and roof tees) and related operations such as grouting of precast concrete members who work 6 feet or more above lower levels must be protected by guardrail systems, safety net systems or personal fall arrest systems.

Each employee engaged in residential construction activity 6 feet or more above lower levels must be protected by guardrail systems, safety net systems or personal fall arrest systems.

Employees working on, at, above or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface, must be protected from falling by the use of guardrail systems, a safety net system, or a personal fall arrest system.

Any employee on a walking/working surface 6 feet or more above the lower levels must be protected from falling by guardrail system, safety net system or personal fall arrest system. Affected employees must wear hard hats at all times to protect from the hazard of falling objects. Toeboards, screens, guardrails or a canopy structure must be assembled to prevent objects from falling from higher levels to lower levels.

### **Fall Protection System Requirements**

#### ***Guardrails***

The top edge height of top rails of guardrail systems or equivalent guardrail system members must be 42 inches plus or minus 3 inches above the walking/working level. When conditions allow, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria outlined in the regulations. If employees use stilts, the top edge height of the top rail or equivalent member must be increased an amount equal to the height of the stilts.

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Midrails, screens, mesh, intermediate vertical members or equivalent intermediate structural members must be installed between the top edge of the guardrail and the walking/working surface when there is no wall or parapet wall at least 21 inches high. When midrails are used, they must be installed at a height midway between the top edge of the guardrail system and the walking/working level. When screens and mesh are used, they shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.

Intermediate members such as balusters, when used between posts, must be more than 19 inches wide. Guardrail systems must be capable of withstanding without failure a force of at least 200 pounds applied within 2 inches of the top edge in any outward or downward direction, at any point along the top edge.

Midrails, screens, mesh, intermediate vertical members, solid panels and equivalent structural members must be capable of withstanding without failure a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail or other member.

Guardrail systems must be surfaced so as to prevent injury to an employee from punctures or lacerations and to prevent snagging of clothing. Neither steel nor plastic banding can be used at the top rails or midrails. Top rails and midrails shall be at least one-quarter inch nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it must be flagged at not more than 6-foot intervals with high visibility material.

When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place. When guardrails are used at holes, they must be erected on all unprotected sides or edges of the hole.

When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than 2 sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use, it must be covered, or a guardrail system must be in place along all unprotected sides and edges.

When guardrail systems are used around holes that are used as points of access (such as ladderways), they must have a gate or be so offset that a person cannot walk directly into the hole. Guardrail systems used on ramps and runways must be erected along each unprotected side or edge.

The site supervisor must inspect manila, plastic or synthetic rope being used for top rails or midrails as frequently as necessary to ensure that it continues to meet the strength requirements.

### *Safety Nets*

Safety nets must be installed as close as practicable under the walking/working surface on which employees are working, but in no case more than 30 feet below such level. When nets are used on bridges, the potential fall area from the walking/working surface to the net must be unobstructed.

Safety nets must extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net:	Minimum required horizontal distance of outer edge of net from the edge of the working surface.
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet
More than 10 feet	13 feet

Safety nets and safety net installations must be drop tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair and at 6-month intervals if left in one place. The drop test must consist of a 400 pound bag of sand 30 (plus or minus 2 inches) in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not less than 42 inches above that level. Safety nets must be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified above.

When it can be demonstrated that it is unreasonable to perform the drop-test, the Operations Manager or his/her designated competent person must certify that the net and net installation is in compliance with the provisions of the regulations and this policy by preparing a certification record prior to the net being used as a fall protection system. The certification record must include: an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance; and the signature of the person

making the determination and certification. The most recent certification record for each net and net installation must be available on the job site for inspection.

Defective nets must not be used. The site supervisor must inspect safety nets at least once a week for wear, damage and other deterioration. Defective components must be removed from service. The site supervisor must inspect safety nets after any occurrence that could affect the integrity of the net system.

Materials, scrap pieces, equipment and tools that have fallen into the safety net must be removed as soon as possible from the net and at least before the next work shift. The site supervisor is responsible for ensuring that fallen materials are removed from the safety net.

The maximum size of each safety net mesh opening shall not exceed 36 square inches nor be longer than 6 inches on any side, and the opening, measured center-to-center of mesh ropes or webbing, must not be longer than 6 inches. All mesh crossings must be secured to prevent enlargement of the mesh opening.

Each safety net or section of it will have a border of rope for webbing with a minimum breaking strength of 5,000 pounds. Connections between safety net panels must be as strong as integral net components and must be spaced not more than 6 inches apart.

### ***Personal Fall Arrest Systems***

Personal fall arrest systems must have connectors that are drop forged, or formed steel, or made of equivalent materials. The connectors must have a corrosion-resistant finish. All surfaces and edges of the connectors must be smooth to prevent damage to interfacing parts of the system. Note: Effective January 1, 1998, body belts may be used as positioning devices but cannot be used for personal fall arrest.

Dee-rings and snaphooks must have a minimum tensile strength of 5,000 pounds. Dee-rings and snaphooks must be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking, or taking permanent deformation. Effective January 1, 1998, only locking type snaphooks are permitted to be used.

On suspended scaffolds or similar work platforms with horizontal lifelines that may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.

Horizontal lifelines must be designed, installed and used under the supervision of a qualified person as part of a complete personal fall arrest system that maintains a safety factor of at least two. The Operations Manager or his/her designee is responsible for

ensuring that the personal fall arrest system used is designed, installed and used under the supervision of a qualified person.

Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds. When vertical lifelines are used, each employee must be attached to a separate lifeline. Exception: During the construction of elevator shafts, two employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is 10,000 pounds (5,000 pounds per employee attached); and all other criteria specified in the regulations regarding vertical lifelines.

Lifelines must be protected against being cut or abraded. Self-retracting lifelines and lanyards that automatically limit free fall to 2 feet or less must be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position. Self-retracting lifelines and lanyards that do not limit free fall distance to 2 feet or less, ripstitch lanyards, and tearing and deforming lanyards must be capable of sustaining a minimum tensile load of 5,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

Ropes and straps used in lanyards, lifelines and strength components of body belts and body harnesses must be made from synthetic fibers. Anchorages used for attachment of personal fall arrest equipment must be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed and used as follows:

- 1) As part of a complete personal fall arrest system which maintains a safety factor or at least two; and
- 2) Under the supervision of a qualified person.

Personal fall arrest systems when stopping a fall must:

- 1) limit maximum arresting force on an employee to 1,800 pounds when used with a body harness;
- 2) be rigged such that an employee can neither free fall more than 6 feet nor contact any lower level;
- 3) bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet; and,
- 4) have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet, or the free fall distance permitted by the system, whichever is less.

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The attachment point of a body belt must be located in the center of the wearer's back. The attachment point of the body harness must be located in the center of the wearer's back near shoulder level, or above the wearer's head. Body belts, harnesses and components shall be used solely for employee protection and not to hoist materials.

Personal fall arrest systems and components subjected to impact loading must be immediately removed from service and must not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

Employees must be promptly rescued in the event of a fall or the Operations Manager must ensure that the employees are able to rescue themselves.

The Warehouse Manager is responsible for inspecting personal fall arrest systems prior to use for wear, damage and other deterioration or defective components. Should damage or deterioration be detected, the Warehouse Manager or his/her designee must remove the defective components from service.

Personal fall arrest systems must not be attached to guardrail systems nor shall they be attached to hoists except as specified in this policy. When a personal fall arrest system is used at hoist areas, it must be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

### *Positioning Device Systems*

Positioning device systems must be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds whichever is greater.

Connectors must be drop forged, pressed or formed steel or made of equivalent materials. Positioning devices must be rigged such that an employee cannot free fall more than 2 feet. Connectors must have a corrosion-resistant finish. All surfaces and edges must be smooth to prevent damage to interfacing parts of this system.

Connecting assemblies must have a minimum tensile strength of 5,000 pounds. Dee-rings and snaphooks must be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking, or sustaining permanent deformation.

As of January 1, 1998, only locking type snaphooks can be used. Unless the snaphook is a locking type and designed for the following connections, snaphooks must not be engaged: directly to webbing, rope or wire rope; to each other; to a dee-ring to which

another snaphook or other connector is attached; to a horizontal lifeline; or, to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

Positioning devices must be inspected by the Warehouse Manager prior to each use for wear, damage, deterioration and defective components. The Warehouse Manager or his/her designee is responsible for removing defective positioning devices from service. Body belts, harnesses and components are to be used solely for employee protection and not to hoist materials.

### ***Warning Lines***

Warning lines shall be erected around all sides of a roof work area. When mechanical equipment is not being used, the warning line must be erected not less than 6 feet from the roof edge. When mechanical equipment is being used, the warning line must be erected not less than 6 feet from the roof edge that is parallel to the direction of mechanical equipment operation, and not less than 10 feet from the roof edge that is perpendicular to the direction of mechanical equipment operation.

Points of access, material handling areas, storage areas and hoisting areas must be connected to the work area by an access path formed by two warning lines.

When the path to a point of access is not in use, a rope, wire, chain or other barricade, equivalent in strength and height to the warning line, must be placed across the path at the point where the path intersects the warning line erected around the work area. Otherwise, the path must be offset such that a person cannot walk directly into the work area.

Warning lines must consist of ropes, wires or chains, and supporting stanchions erected as follows:

- 1) The rope, wire or chain must be flagged at not more than 6-foot intervals with highly visible material;
- 2) The rope, wire or chain must be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches from the walking/working surface and its highest point is no more than 39 inches from the walking/working surface;
- 3) After being erected, with the rope, wire or chain attached, stanchions must be capable of resisting without tipping over, a force of at least 16 pounds applied horizontally against the stanchion, 30 inches above the walking/working surface.

perpendicular to the warning line, and in the direction of the floor, roof or platform edge;

- 4) The rope, wire or chain must have a minimum tensile strength of 500 pounds and after being attached to the stanchions, must be capable of supporting, without breaking, the loads applied to the stanchions as described above;
- 5) The line must be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.

No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area. Employees who violate this and/or other safety procedures/policies may be subject to disciplinary action up to and including termination. Mechanical equipment on roofs must be used or stored only in areas where employees are protected by a warning line system, guardrail system or personal fall arrest system.

#### *Controlled Access Zones*

Controlled access zones will be defined by a control line or by any other means that restricts access when control access zones are used in areas where leading edge or other operations are taking place.

Control lines shall be erected not less than 6 feet nor more than 25 feet from the unprotected or leading edge, except when erecting precast concrete members. When erecting precast concrete members, control lines must be erected not less than 6 feet nor more than 60 feet or half the length of the member being erected, whichever is less, from the leading edge.

The control line must extend along the entire length of the unprotected or leading edge and must be approximately parallel to the unprotected or leading edge.

The control line must be connected on each side to a guardrail system or wall. When used to control access to areas where overhand bricklaying and related work is taking place:

- 1) the controlled access zone must be defined by a control line erected not less than 10 feet or more than 15 feet from the working edge.
- 2) the control line must extend for a distance sufficient for the controlled access zone to enclose all employees performing overhand bricklaying and related work at the working edge and must be approximately parallel to the working edge.



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- 3) Additional control lines must be erected at each end to enclose the controlled access zone.

Only employees engaged in overhand bricklaying or related work may be permitted in the controlled access zone.

Control lines must consist of ropes, wires, tapes or equivalent materials, and supporting stanchions as follows:

- 1) Each line must be flagged or otherwise clearly marked at not more than 6-foot intervals with highly visible material.
- 2) Each line will be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches from the walking/working surface and its highest point is not more than 45 inches (50 inches when overhand bricklaying is performed) from the walking/working surface.
- 3) Each line must have a minimum breaking strength of 200 pounds.

On floors and roofs where guardrail systems are not in place prior to beginning of overhand bricklaying operations, controlled access zones must be enlarged, as necessary, to enclose all points of access, material handling areas and storage areas.

On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

### ***Safety Monitoring Systems***

The Operations Manager is responsible for designating a competent person to monitor the safety of other employees and ensuring that the safety monitor complies with the following requirements.

The Safety Monitor must be competent in recognizing fall hazards. The Safety Monitor is responsible for warning the employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner.

The Safety Monitor will be on the same walking/working surface and within visual contact of the employee being monitored. The Safety Monitor must be close enough to communicate orally with the employee. The Safety Monitor can not be assigned other responsibilities that could take the monitor's attention from the monitoring function.

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Mechanical equipment cannot be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.

No employee, other than an employee engaged in roofing work (on low-sloped roofs) or an employee covered by a fall protection plan, shall be allowed in an area where an employee is being protected by a safety monitoring system.

Each employee working in a controlled access zone is responsible for complying promptly with fall hazard warnings from the Safety Monitor.

### *Covers*

Covers located in roadways and vehicular aisles must be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.

All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

All covers must be secured when installed so as to prevent accidental displacement by the wind, equipment or employees.

All covers must be color coded or they must be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

Note: This does not apply to cast iron manhole covers or steel grates used on streets or roadways.

### *Protection from Falling Objects*

Toeboards, when used as falling object protection, must be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below.

Toeboards must be capable of withstanding, without failure, a force of at least 50 pounds applied in any downward or outward direction at any point along the toeboard.

Toeboards must be a minimum of 3 ½ inches in vertical height from their top edge to the level of the walking/working surface. They must have no more than ¼ inch clearance

### III SAMPLE FALL PROTECTION PLAN

Fall protection plans must be developed and implemented for job sites involving leading edge work when it can be demonstrated that it is infeasible or creates a greater hazard to use conventional fall protection systems. The Project Manager is responsible for designing or ensuring the design of a fall protection plan that meets the requirements of 29 CFR 1926.502. The Operations Manager or his/her designee is responsible for ensuring the implementation of the fall protection plan on the project site. A Fall Protection Plan must be developed and evaluated on a site by site basis. A sample fall protection plan has been included in Attachment A to be used as a guide for designing fall protection plans. The sample plan can be modified in order to meet site specific requirements that involve leading edge work. The sample plan outlines elements that must be present in any fall protection plan.

The fall protection plan must be prepared by a qualified person and developed specifically for the site where the leading edge work, precast concrete work, or residential construction work is being performed. The plan must be maintained up to date.

A qualified person must approve any changes to the fall protection plan. A copy of the fall protection plan with all approved changes must be maintained at the job site.

The fall protection plan must document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety net systems) are infeasible or why their use would create greater hazard.

The fall protection plan must include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the plan may discuss the extent to which scaffolds, ladders or vehicle mounted work platforms can be used to provide a safer working surface, thereby reducing the hazard of falling.

The fall protection plan must identify each location where conventional fall protection methods cannot be used. These locations must then be classified as controlled access zones the criteria for controlled access zones apply.

Where no other alternative measure has been implemented, a safety monitoring system will be implemented.

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The fall protection plan must include a statement that provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.

In the event that an employee falls or some other related serious incident occurs, the circumstances will be investigated to determine if the fall protection plan needs to be changed (e.g., new practices, procedures or training) and changes will be implemented to prevent similar types of falls or incidents.